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# 1982

## Census of Manufactures

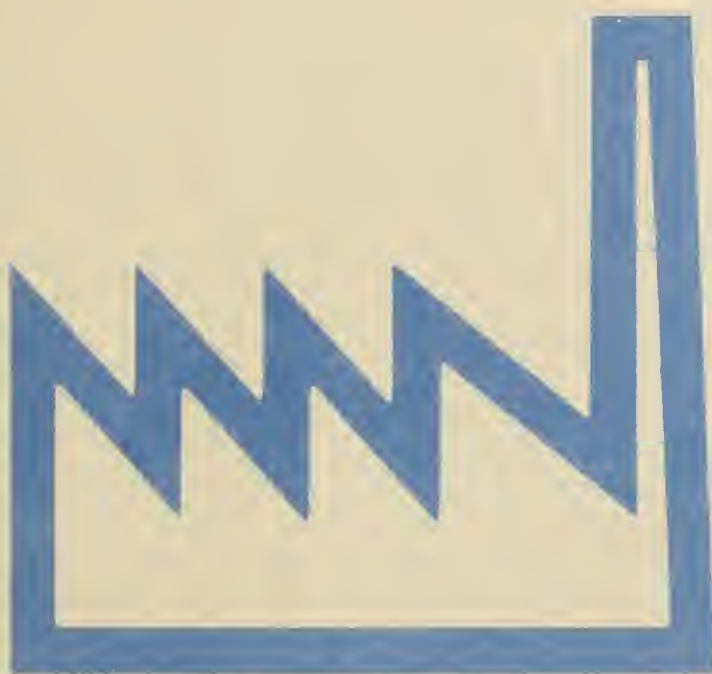
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MC82-I-29A

INDUSTRY SERIES

## Petroleum and Coal Products

Industries 2911, 2951, 2952, 2992, and 2999



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The publications  
from the 1982 Economic and  
Agriculture Censuses are dedicated  
to the memory of Shirley Kallek,  
Associate Director for Economic Fields.  
During her career at the Bureau of the  
Census (1955 to 1983), she continually  
directed efforts to improve  
the timeliness and accuracy of  
economic statistics.

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# 1982

## Census of Manufactures

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MC82-I-29A

INDUSTRY SERIES

## Petroleum and Coal Products

2911 Petroleum Refining  
2951 Paving Mixtures and Blocks  
2952 Asphalt Felts and Coatings  
2992 Lubricating Oils and Greases  
2999 Petroleum and Coal Products, N.E.C.

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Issued March 1985



**U.S. Department of Commerce**

**Malcolm Baldrige**, Secretary

**Clarence J. Brown**, Deputy Secretary

**Sidney Jones**, Under Secretary for  
Economic Affairs

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**Economic Fields**

**John H. Berry, Assistant Director for**  
**Economic and Agriculture Censuses**

**INDUSTRY DIVISION**  
**Gaylord E. Worden, Chief**

**ACKNOWLEDGMENTS**—Many persons participated in the various activities of the 1982 Census of Manufactures. Primary direction of the program was performed by **Shirley Kallak**, Associate Director for Economic Fields (until May 1983), **Charles A. Waite**, her successor, and **Michael G. Farrell**, Assistant Director for Economic and Agriculture Censuses (until August 1984), and **John H. Berry**, his successor.

This report was prepared in the Industry Division under the general direction of **Roger H. Buganhagan**, Chief (until April 1983), and **Gaylord E. Worden**, his successor. **John P. Govoni**, Assistant Chief for Census/Annual Survey of Manufactures (ASM) Programs, was responsible for the overall management of the census of manufactures. He guided the planning and implementation of the project and coordinated activities with other divisions.

Program responsibility was shared by the following individuals who participated importantly in the entire program: **John P. McNamee**, Chief, Minerals Branch; **Dale W. Gordon**, Chief, Census/ASM Durables Branch; **Michael J. Zampogna**, Chief, Census/ASM Nondurables Branch; **Bernard J. Fitzpatrick**, Chief, Census Special Reports Branch (until April 1983); and **Bruce M. Goldhirsch**, his successor; **Kenneth I. Hansen**, Chief, Annual Survey of Manufactures Branch; **Malcolm E. Bernhardt**, Chief, Current Durables Branch; and **Carole A. Amblar**, Chief, Current Nondurables Branch.

**Allen H. Foreman, Jr.**, Chief, Forest Products, Printing and Publishing, and Chemicals Section, assisted by **Mark Schmidt**, was directly responsible for the analysis of the data and preparation of this report.

**Dr. Edward A. Robinson**, Senior Industry Statistician, made significant contributions to the basic economic concepts and content of the census. The computer processing systems were developed and coordinated under the direction of **William E. Norfolk**, Assistant Chief for Operations. **Sarah A. Mathis**, Chief, Census Programming Branch, was responsible for implementation of the computer systems, and the computer programs were prepared under the supervision of **David Onions** and **Gerald S. Turnage**, assisted by **Barbara A. Lambert**. The mathematical techniques and quality control requirements were developed by **Preston J. Walta**, Assistant Chief for Research and Methodology, assisted by **Stacey Cola**, **Pamala McKee**, **Amalia M. Peregoy**, **Magdalena Ramos**, and **Ann M. Staphans**.

Industry classification was controlled by **Bruce M. Goldhirsch**; coordination activities with Data Preparation Division were carried out by **Eric Taylor**; and the various phases of the publication process were coordinated by **Lille Mae Skinner**. Other persons made important contributions in such areas as developing specifications, procedures, and resolving problems. They include **Richard J. Sterner**, **Robert A. Rosati**, **Richard Sweeney**, **Cyr F. Llonis**, **Leonard Pomeroy**, **Patricia L. Hornling**, and **Dennis L. Wagner**.

Systems and procedures for mailout, receipt, correspondence, data input, industry classification, other clerical processing, administrative record

processing, and quality control, along with the associated electronic computer programs, were developed in the Economic Surveys Division, **W. Joel Richardson**, Chief.

Planning, design, review, and composition of report forms were performed in the Administrative Services Division, **Robert L. Kirkland**, Chief.

Publication planning, design, editorial review, composition, and printing procurement were performed in the Publications Services Division, **Raymond J. Koski**, Chief.

Geographic coding procedures and associated computer programs were developed in the Geography Division, **Robert W. Marx**, Chief.

Mailout preparation and receipt operations, clerical and analytical review activities, data keying, and geocoding review were performed in the Data Preparation Division, **Don L. Adams**, Chief.

Computer processing was performed in the Computer Services Division, **C. Thomas DiNanna**, Chief (until February 1984), and **John E. Halterman**, his successor.

Photocomposition programs for the statistical tables were developed in the Systems Support Division, **Larry J. Patin**, Chief (until October 1983), and **Arnold E. Lavlin**, his successor.

Special-purpose computer programs for disclosure analysis were developed in the Business Division, **Gerald F. Cranford**, Chief (until December 1983), and **Howard N. Hamilton**, his successor.

The overall planning and review of the census operations were performed by the staff of the office of the Assistant Director for Economic and Agriculture Censuses.

Special acknowledgment is also due the many businesses whose cooperation has contributed to the publication of these data.

**Library of Congress Cataloging in Publication Data**

Census of manufactures (1982)  
1982 census of manufactures.

Contents: [1] Geographic area series — [2] Industry series.

Supt. of Docs. no.: C 3.24/8: MC82-I

1. United States—Manufactures—Statistics.

I. United States. Bureau of the Census. II. Title.

HD9724.C4 1984 338.4'767'0973

83-600153

For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

# INTRODUCTION

## ECONOMIC CENSUSES OVER TIME

The early beginnings of America's industrial output were first measured in the United States in the 1810 Decennial Census and again in 1820, when questions on manufacturing were included with those for population. Beginning with the 1840 Decennial Census, there were enumerations of manufactures and mineral industries at 10-year intervals up to and including the year 1900 for manufactures and 1940 for mineral industries. The latter census was again taken for 1954, 1958, 1963, and 1967.

Because of the increasing dominance of manufacturing in the early 20th century, Congress directed that quinquennial censuses of manufactures be taken beginning in 1905. However, from 1919 through 1939, these censuses were conducted every 2 years. The need for war-related current surveys in the early 1940's postponed the next census of manufactures until 1948 (for 1947). That census was again taken for 1954, 1958, 1963, and 1967.

Retail and wholesale trade data were first collected in 1930, and in 1933 information on selected service industries was added to the data-collection operation. These business censuses, as they were called, were again taken for 1935, 1939 (as part of the 1940 decennial program), 1948, 1954, 1958, 1963, and 1967.

Information on construction industries was obtained first in 1930 and again for 1935 and 1939. Data for the full spectrum of construction industries were not gathered again until 1968 (for 1967).

The need for transportation data to supplement information available from existing governmental or private sources was recognized by Congress in the late 1950's and early 1960's. The census of transportation (consisting of several surveys) was taken first for 1963 and again for 1967.

Since 1967, all of the above censuses have been taken quinquennially as part of the Census Bureau's economic census program. (For the 1977 censuses, the coverage of the service industries was broadened from "selected services" to "all services, except religious organizations and private households." A total of 41 additional four-digit standard industrial classifications<sup>1</sup> (SIC's) in 7 SIC major groups was added to the scope of the census. While most of the industries included for the first time for 1977 were covered again for 1982, some were not, i.e., hospitals; elementary and secondary schools; colleges, universities, and professional schools; junior colleges and technical institutes; labor unions and similar labor organizations; and political organizations.)

The first manufacturing census for an outlying area was conducted in Puerto Rico for the year 1909. Thereafter, with the exception of 1929, a census was taken at 10-year intervals through 1949. The first censuses of retail trade, wholesale trade, and selected service industries in Puerto Rico were conducted for 1939. These censuses also were taken for the years 1949, 1954, 1958, 1963, and 1967. A census of construction industries was introduced first in Puerto Rico for 1967. These censuses of Puerto Rico have been taken since then for the years 1972, 1977, and 1982.

Censuses of manufactures, retail trade, wholesale trade, and selected service industries were conducted in Guam and the

Virgin Islands of the United States for 1958, 1963, 1967, 1972, 1977, and 1982. Censuses of mineral industries were taken in the Virgin Islands of the United States for the years 1958, 1963, and 1967 but not since that time. A census of construction industries was also undertaken in these areas for 1972, 1977, and 1982.

Retail trade, wholesale trade, selected service industries, manufacturing, and construction industries were canvassed for the first time in the Northern Mariana Islands in 1983 (for 1982).

For 1982, the economic censuses and agriculture censuses were conducted concurrently.

## USES OF THE ECONOMIC CENSUSES

The economic censuses are the major source for facts about the structure and functioning of the Nation's economy and provide essential information for government, business, industry, and the general public. They provide an important part of the framework for such composite measures as the gross national product, input-output measures, indexes of industrial production, and indexes measuring productivity and price levels. Information from the censuses is used to establish sampling frames and as benchmarks for current surveys of business activity, which are essential for measuring short-term economic conditions.

State and local governments use census data to assess business activities within their jurisdictions. The private sector uses the data to forecast general economic conditions; analyze sales performance; lay out sales territories; allocate funds for advertising; decide on locations for new plants, warehouses, or stores; and measure potential markets in terms of size, geographic areas, kinds of business, and kinds of products made or sold.

Following every census, thousands of businesses and other users purchase reports. Likewise, census facts are disseminated widely by trade associations, business journals, and newspapers. Volumes containing census statistics are available in most major public and college libraries. All 1982 data are available on microfiche from the U.S. Government Printing Office and most data on computer tape from the Census Bureau. Finally, the more than 50 State Data Centers also are suppliers of economic census statistics.

## AUTHORITY AND SCOPE OF THE ECONOMIC CENSUSES

The economic censuses are required by law under title 13 of the United States Code, sections 131, 191, and 224, which directs that they be taken at 5-year intervals for the years ending in 2 and 7. The 1982 Economic Censuses covered manufacturing, mining, construction industries, retail trade, wholesale trade, service industries, and selected transportation activities. Special programs also cover minority-owned and women-owned businesses. The next economic censuses are scheduled to be taken in 1988 for the year 1987.

<sup>1</sup>Standard Industrial Classification Manual: 1972. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 041-001-00066-6. 1977 Supplement. Stock No. 003-00500176-0.

# CENSUS OF MANUFACTURES

## General

The 1982 Census of Manufactures is the 31st census of manufactures of the United States. For 1982, it was conducted jointly with the censuses of mineral industries, construction industries, retail and wholesale trades, service industries, selected transportation activities, and minority-owned and women-owned businesses.

This report, from the 1982 Census of Manufactures, is one of a series of 82 industry reports, each of which provides statistics for groups of related industries. Additional separate reports will be issued for each State and on special subjects, such as size of establishments, legal form of organization, and fuels and electric energy consumed.

These separate reports will subsequently be issued as portions of the final census volumes. Volume I, Subject Statistics, will show comparative statistics for industries, States, and standard metropolitan statistical areas. It also will show selected subjects, such as concentration ratios in manufacturing, selected materials consumed, manufacturing activity in government establishments, and water use in manufacturing. Volume II, Industry Statistics, will be a consolidation of reports for the 82 groups of industries showing the same information that is shown in this report. Volume III, Geographic Area Statistics, will contain establishment-based data (number of establishments, employment, payroll, value added by manufacture, and capital expenditures) for each State and its important standard metropolitan statistical areas, counties, and places, by industry groups and important individual industries. Totals for "all manufacturing" will be shown for counties and places with more than 450 manufacturing employees. The introduction to the final volumes will discuss, at greater length, many of the subjects described in this introduction. For example, the volume text will discuss the relationship of value added by manufacture to National income by industry of origin, the changes in statistical concepts over the history of the censuses, and the valuation problems arising from intracompany transfers between manufacturing plants of a company and between manufacturing plants and sales offices and sales branches of a company.

## Scope of Census and Definition of Manufacturing Industries

The 1982 Census of Manufactures covers all establishments employing one person or more primarily engaged in manufacturing as defined in the 1972 Standard Industrial Classification (SIC) Manual and its 1977 Supplement.<sup>1</sup> This is the system of industrial classification developed over a period of years by experts on classification in government and private industry under the guidance of the Office of Management and Budget. This system of classification is in general use among government agencies as well as organizations outside the government.

The SIC manual defines manufacturing as the mechanical or chemical transformation of inorganic or organic substances into new products. The assembly of component parts of products is also considered to be manufacturing if the resulting product is neither a structure nor other fixed improvement. These activities are usually carried on in plants, factories, or mills that characteristically use power-driven machines and materials handling equipment.

<sup>1</sup>Standard Industrial Classification Manual: 1972. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 041-001-00066-6. 1977 Supplement. Stock No. 003-00500176-0.

Manufacturing production is usually carried on for the wholesale market, for transfers to other plants of the same company, or to the order of industrial users rather than for direct sale to the household consumer. Some manufacturers in a few industries sell chiefly at retail to household consumers through the mail, through house-to-house routes, or through salespersons. Some activities of a service nature (enameling, engraving, etc.) are included in manufacturing when they are performed primarily for the trade. They are considered nonmanufacturing when they are performed primarily to the order of the household consumer.

## Relationship Between Annual Survey of Manufactures and Census of Manufactures

The Bureau of the Census conducts the annual survey of manufactures (ASM) in each of the 4 years between the censuses of manufactures. The ASM is based on a scientifically selected sample of approximately 55,000 establishments and collects the same industry statistics (employment, payroll, value of shipments, etc.) as the census of manufactures. In addition to collecting the information normally requested on the census form, the establishments in the ASM sample are requested to supply detailed information on assets, capital expenditures, retirements, depreciation, rental payments, supplemental labor costs, and costs of purchased services.

## Establishment Basis of Reporting

The census of manufactures and the annual survey of manufactures are conducted on an establishment basis. A company operating at more than one location is required to file a separate report for each location. Companies engaged in distinctly different lines of activity at one location are requested to submit separate reports if the plant records permit such a separation and if the activities are substantial in size.

In 1982, as in earlier years, a minimum size limit was set for including establishments in the census. All establishments employing one person or more at any time during the census year are included. The same size limitation has applied since 1947 in censuses and annual surveys of manufactures. In the 1939 and earlier censuses, establishments with less than \$5,000 value of products were excluded. The change in the minimum size limit in 1947 does not appreciably affect the historical comparability of the census figures except for data on number of establishments for a few industries.

This report excludes information for separately operated administrative offices, warehouses, garages, and other auxiliary units that service manufacturing establishments of the same company (see Auxiliaries).

## Manufacturing Universe and Census Report Forms

The 1982 Census of Manufactures universe includes approximately 345,000 establishments. The amounts of information requested from manufacturing establishments were dependent upon a number of factors. The more important considerations were the size of the company and whether it was included in the annual survey of manufactures. The methods of obtaining information for the various subsets of the universe to arrive at the aggregate figures shown in this publication are described below.

### 1. Small Single-Unit Companies Not Sent a Report Form

In the 1982 Census of Manufactures, approximately 140,000 small single-establishment companies were excused from filing reports. Selection of these small

establishments was done on an industry-by-industry basis and was based on annual payroll and total shipments data as well as on the industry classification codes contained in the administrative records of other Federal agencies. The cutoffs were selected so that these administrative records cases would account for no more than 3 percent of the value of shipments for the industry. Generally, all single-establishment companies with less than 5 employees were excused, while all establishments with more than 20 employees were mailed report forms.

Information on the physical location of the establishment, as well as information on payrolls, receipts (shipments), and industry classification, was obtained from the administrative records of other Federal agencies under special arrangements, which safeguarded their confidentiality. Estimates of data for these small establishments were developed using industry averages in conjunction with the administrative information. The value of shipments and cost of materials were not distributed among specific products and materials for these establishments but were included in the product and material "not specified by kind" (n.s.k.) categories.

The industry classification codes included in the administrative records files were assigned on the basis of brief descriptions of the general activity of the establishment. As a result, an indeterminate number of establishments were erroneously coded to the four-digit SIC level. This was especially true whenever there was a relatively fine line of demarcation between industries or between manufacturing and nonmanufacturing activity.

Sometimes these administrative record cases were given only a two- or three-digit SIC group. For the 1982 Census of Manufactures, these establishments were sent a separate classification form, which requested information on the products and services of the establishment. This form was used to code many of these establishments to the four-digit SIC level. Establishments that did not return the classification form were coded later to those four-digit SIC industries identified as "not elsewhere classified" (n.e.c.) within the given two- or three-digit industry groups.

As a result of these situations, a number of small establishments may have been misclassified by industry. However, such possible misclassifications have no significant effect on the statistics other than on the number of establishments.

The total establishment count for individual industries should be viewed as an approximation rather than a precise measurement. The counts for establishments with 20 employees or more are far more reliable than the count of total number of establishments.

## 2. Establishments Sent a Report Form

The 205,000 establishments covered in the mail canvass were divided into three groups:

**a. ASM sample establishments**—This group consisted of approximately 55,000 establishments covering all the units of large manufacturing establishments as well as a sample of the medium and smaller establishments. The probability of selection was proportionate to size (see appendix, Annual Survey of Manufactures).

In a census of manufactures year, the ASM report form (MA-1000) replaces the first page of the regular census form for those establishments included in the ASM. In addition to information on employment, payroll,

and other items normally requested on the regular census form, establishments in the ASM sample were requested to supply information on assets, capital expenditures, retirements, depreciation, rental payments, supplemental labor costs, and costs of purchased services. Results of the ASM inquiries are included in tables 3c and 3d of this report.

The census part of the report form is one of approximately 200 versions containing product, material, and special inquiries. The diversity of manufacturing activities necessitated the use of this many forms to canvass the approximately 450 manufacturing industries. Each form was developed for a group of related industries.

Appearing on each form was a list of products primary to the group of related industries, as well as secondary products and miscellaneous services that establishments classified in these industries were likely to be performing. Respondents were requested to identify the products, the value of each product, and, in a large number of cases, the quantity of the product shipped during the survey year. Space was also provided for the respondent to describe products not specifically identified on the form.

The report form also contained a materials-consumed inquiry, which varied from form to form depending on the industries being canvassed. The respondents were asked to review a list of materials generally used in their production processes. From this list, each establishment was requested to identify those materials consumed during the survey year, the cost of each, and, in certain cases, the quantity consumed. Once again, space was provided for the respondent to describe significant materials not identified on the form.

Finally, a wide variety of special inquiries was included to measure activities peculiar to a given industry, such as operations performed and equipment used.

### b. Large and medium establishments (non-ASM)—

Approximately 100,000 establishments were included in this group. A variable cutoff, based on administrative records payroll data and determined on an industry-by-industry basis, was used to select those establishments that were to receive one of the approximately 200 census of manufactures regular forms. The first page, requesting establishment data for items such as employment and payroll, was standard but did not contain the detailed statistics included on the ASM form. The product, material, and special inquiry sections supplied were based on the historical industry classification of the establishment.

### c. Small single-unit establishments (non-ASM)—

This group consisted of approximately 50,000 establishments. For those industries where application of the variable cutoff for administrative records cases resulted in a large number of small establishments being included in the mail canvass, an abbreviated or "short" form was used. These establishments received one of the approximately 80 versions of the short form, which requested summary product and material data and totals but no details on employment, payrolls, cost of materials, inventories, and capital expenditures.

Use of the short form has no adverse effect on published totals for the industry statistics; the same

data were collected on the short as well as the long form. However, detailed information on materials consumed was not collected on the short form; thus its use would increase the values of the n.s.k. categories.

## Auxiliaries

In this industry report, the data on employment and payroll are limited to operating manufacturing establishments. The census report form filed for auxiliaries (ES-9200) requested a description of the activity of the establishments serviced. However, the auxiliaries were coded only to the two-digit major group of the establishments they served; whereas, the operating establishments were coded to a four-digit manufacturing industry. Data for the approximately 10,000 separately operated auxiliaries are included in the paperbound geographic area series, the bound volumes of the census of manufactures, and in a report issued as part of the 1982 Enterprise Statistics survey.

Auxiliaries are establishments whose employees are primarily engaged in performing supporting services for other establishments of the same company, rather than for the general public or for other business firms. They can be at different locations from the establishments served or at the same location as one of those establishments but not operating as an integral part thereof and serving two or more establishments. Where auxiliary operations are conducted at the same location as the manufacturing operation and operate as an integral part thereof, they usually are included in the report for the operating manufacturing establishment.

Included in the broad category of auxiliaries are administrative offices. Employees in administrative offices are concerned with the general management of multiestablishment companies, i.e., with the general supervision and control of two units or more, such as manufacturing plants, mines, sales branches, or stores. The functions of these employees may include (1) program planning, including sales research and coordination of purchasing, production, and distribution; (2) company purchasing, including general contracts and purchasing methods; (3) company financial policy and accounting, tax accounting, company sales and profit reports, and personnel accounting; (4) general engineering, including design of product machinery and equipment, and direction of engineering effort conducted at the individual operation locations; (5) direction of company personnel matters; and (6) legal and patent matters.

Other types of auxiliaries serving the plants or central management of the company include purchasing offices, sales promotion offices, research and development organizations, etc.

## Industry Classification of Establishments

Each of the establishments covered in the census was classified in one of approximately 450 manufacturing industries in accordance with the industry definitions in the SIC system. Under this system of classification, an industry is generally defined as a group of establishments producing a single product or a closely related group of products. The product groupings from which industry classifications are derived are based on considerations such as similarity of manufacturing processes, types of materials used, types of customers, and the like. The resulting group of plants must be significant in terms of its number, value added by manufacture, value of shipments, and number of employees. The system operates in such a way that the definitions progressively became narrower with successive additions of numerical digits. There are 20 major groups (two-digit SIC), 143 industry groups (three-digit SIC), and approximately 450

industries (four-digit SIC). The product classes and products of the manufacturing industries have been assigned codes based on the industry from which they originate. There are about 1,500 classes of products, identified by a five-digit code, and about 11,000 products, identified by a seven-digit code. The seven-digit products are considered the primary products of the industry with the same four digits.

Accordingly, an establishment is usually classified in a particular industry on the basis of its major activity during a particular year, i.e., production of the products primary to that industry exceeds, in value, production of the products primary to any other single industry. In a few instances, however, the industry classification of an establishment is not only determined by the products it makes but also by the process employed in making those products. For example, establishments engaged in blast furnace operations, refining of nonferrous metals from ore, or rolling and drawing of nonferrous metals (processes which involve heavy capitalization in specialized equipment) would be classified according to the process used during a census year. These establishments then would be "frozen" in that industry during the following ASM years.

In either a census or ASM year, establishments included in the ASM sample with certainty weight, other than those involved with heavily capitalized activities described above, are reclassified by industry only if the change in the primary activity from the prior year is significant or the change has occurred for two successive years. This procedure prevents reclassification when there are minor shifts in product mix.

In ASM years, establishments included in the ASM sample with noncertainty weight are not shifted from one industry classification to another. They are retained in the industry where they were classified in the base census year (see appendix, Annual Survey of Manufactures). However, in the following census year, these ASM plants are allowed to shift from one industry to another.

The result of these rules covering the switching of plants from one industry classification to another is that, at the aggregate level, some industries comprise different mixes of establishments between survey years, and establishment data for such industry statistics as employment and payroll may be tabulated in different industries between survey years. Hence, comparisons between prior-year and current-year published totals, particularly at the four-digit SIC level, should be viewed with caution. This is true particularly for the comparison between the data shown for a census year versus the data shown for the previous ASM year.

As previously noted, the small establishments that may have been misclassified by industry are usually administrative-record cases whose industry codes were assigned on the basis of incomplete descriptions of the general activity of the establishment. Such possible misclassifications have no significant effect on the statistics other than on the number of establishments.

While some establishments produce only the primary products of the industry in which they are classified, all establishments of an industry rarely specialize to this extent. The industry statistics (employment, inventories, value added by manufacture, total value of shipments including resales and miscellaneous receipts, etc.) shown in tables 1a through 5a, therefore, reflect not only the primary activities of the establishments in that industry but also their secondary activities. The product statistics in tables 6a through 6c represent the output of all establishments whether or not they are classified in the same industry as the product. For this reason, in relating the industry statistics, especially the value of shipments to the product statistics, the

composition of the industry's output shown in table 5b should be considered.

The extent to which industry and product statistics may be matched with each other is measured by two ratios, which are computed from the figures shown in table 5b. The first of these ratios, called the primary product specialization ratio, measures the proportion of product shipments (both primary and secondary) of the establishments classified in the industry represented by the primary products of those establishments. The second ratio, called the coverage ratio, is the proportion of primary products shipped by the establishments classified in the industry to total shipments of such products by all manufacturing establishments.

However, establishments making products falling into the same industry category may use a variety of processes and materials to produce them. Also, the same industry classification (based on end products) may include both establishments that are highly integrated and those that put only the finishing touches on an already highly fabricated item. For example, the refrigeration industry includes instances of almost complete integration (production of the compressor, condensing unit, electric motor, casting, stamping of the case, and final assembly) all carried on at one plant. On the other hand, the condensing unit, the motor, and the case may be purchased and only assembled into the finished product.

In some instances, separate industry categories have been established for integrated and nonintegrated establishments. For other industries, the census provides separate statistics on the production of intermediate commodities made and used in the producing plant. For some industries characterized by many plants of the same company, separate figures on interplant transfer of products usually are shown.

Differences in the integration of production processes, types of operations, and alternatives in types of materials used should be considered when relating the industry statistics (employment, payrolls, value added, etc.) to the product and material data.

## **Value of Shipments for the Industry Compared With Value of Product Shipments**

This industry report shows value of shipments data for industries and products. In tables 1a through 5a, these data represent the total value of shipments of all establishments classified in a particular industry. The data include the shipments of the products classified in the industry (primary to the industry), products classified in other industries (secondary to the industry), and miscellaneous receipts (repair work, sale of scrap, research and development, installation receipts, and resales). Product shipments shown in table 6a represent the total value of shipments of products classified as primary to an industry that were shipped by all manufacturing establishments regardless of their industry classification.

## **CENSUS DISCLOSURE RULES**

In accordance with Federal law governing census reports, no data are published that would disclose the data for an individual establishment or company. However, the number of establishments classified in a specific industry is not considered a disclosure, so this item may be given even though other information is withheld.

The disclosure analysis for the industry statistics in tables 1a through 5a of this report is based on the total value of shipments. When the total value of shipments cannot be shown without disclosing information for individual companies, the complete line has been suppressed. However, the suppressed data are included in higher level totals. Additional disclosure analysis is performed for new capital expenditures that can be suppressed even though value of shipments data are publishable.

## **MICROFICHE AND COMPUTER TAPES**

All the data in this report are available on microfiche. Selected data are also available on computer tape.

In addition to selected published data being on computer tape, one major data series, the location of manufacturing plants, will be available only on computer tape. This series presents the number of establishments by employment size class by four-digit SIC industry codes for States, counties, and places of 2,500 inhabitants or more. These data are available for both State and county by industry, and State and place by industry.

Microfiche reports are sold by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Computer tapes are sold by the Data User Services Division, Customer Services (Tapes), Bureau of the Census, Washington, D.C. 20233.

## **SPECIAL TABULATIONS**

Special tabulations of data collected in the 1982 Census of Manufactures may be obtained on computer tape or in tabular form. The data will be in summary form and subject to the same rules prohibiting disclosure of confidential information (including name, address, kind of business, or other data for individual business establishments or companies) as are the regular publications.

Special tabulations are prepared on a cost basis. A request for a cost estimate, as well as exact specifications on the type and format of the data to be provided, should be directed to the Chief, Industry Division, Bureau of the Census, Washington, D.C. 20233.

## **ABBREVIATIONS AND SYMBOLS**

The following abbreviations and symbols are used in this publication:

- Represents zero.
- (D) Withheld to avoid disclosing data for individual companies; data are included in higher level totals.
- (NA) Not available.
- (NC) Not comparable.
- (S) Withheld because estimate did not meet publication standards on the basis of either the response rate or a consistency review.
- (X) Not applicable.
- (Z) Less than half the unit shown.
- n.e.c. Not elsewhere classified.
- n.s.k. Not specified by kind.
- pt. Part.
- r Revised.
- SIC Standard Industrial Classification.

Other abbreviations, such as lb, gal, yd, doz, bbl, and s tons, are used in the customary sense.

# Users' Guide for Locating Statistics

[For explanation of terms, see appendixes]

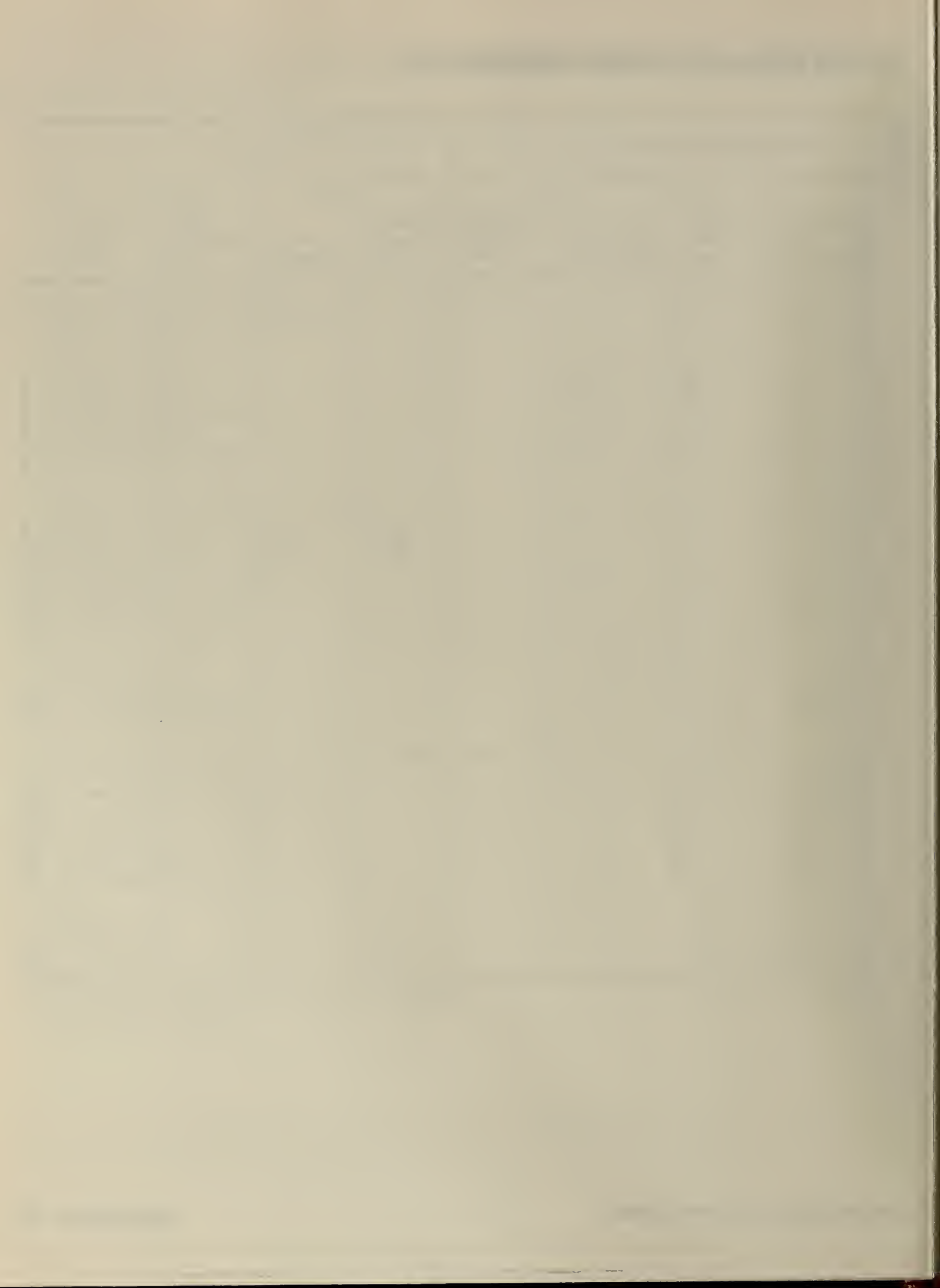
	Item	Four-digit industry statistics		
		Historical	Operating ratios	By geographic area
1	Number of companies . . . . .	1a		
2	Number of manufacturing establishments . . . . .	1a		2
	Employment and payroll:			
3	Number of employees . . . . .	1a	1b	2
4	Payroll . . . . .	1a	1b	2
5	Supplemental labor costs . . . . .			
6	Production workers . . . . .	1a	1b	2
7	Production-worker hours . . . . .	1a	1b	2
8	Production-worker wages . . . . .	1a	1b	2
	Shipments, cost of materials, and value added:			
9	Value of shipments (four-digit) . . . . .	1a	1b	2
10	Product class shipments (five-digit) . . . . .			
11	Product shipments (seven-digit) . . . . .			
12	Value added by manufacture . . . . .	1a	1b	2
13	Cost of materials . . . . .	1a	1b	2
14	Fuels and electric energy . . . . .			
15	Materials consumed by kind . . . . .			
	Inventories:			
16	Total, end of year . . . . .	1a		
17	By method of valuation . . . . .			
18	By stage of fabrication . . . . .			
	Capital expenditures, assets, rental payments, and purchased services:			
19	New capital expenditures . . . . .	1a		2
20	Used plant and equipment expenditures . . . . .			
21	Gross assets . . . . .			
22	Depreciation . . . . .			
23	Retirements of buildings and machinery . . . . .			
24	Rental payments . . . . .			
25	Purchased services . . . . .			
	Ratios:			
26	Specialization . . . . .	1a		
27	Coverage . . . . .	1a		

\*Number of companies with shipments of over \$100 thousand.

\*\*Detailed information shown.

# in This Report by Table Number

Four-digit industry statistics—Con.				Five-digit product class and seven-digit product statistics				
Summary and supplemental	By employment size	By industry and product class specialization	Materials consumed by kind	Industry-product analysis	Product shipments	Product class by geographic area	Historical product class	
3a					*6a			1
** 3a	4	5a						2
3a	4	5a						3
3a	4	5a						4
** 3d								5
** 3a	4	5a						6
** 3a	4	5a						7
3a	4	5a						8
3a	4	5a		5b, 5c				9
				5b, 5c	6a	6b	6c	10
					6a			11
3a	4	5a						12
** 3a	4	5a						13
3a, 3d			7					14
								15
3b, 3c	4							16
3b, 3c								17
3b								18
** 3a, ** 3d	4	5a						19
** 3a, ** 3d								20
** 3d								21
** 3d								22
** 3d								23
** 3d								24
** 3d								25
3a				5b				26
3a				5b				27



# Petroleum and Coal Products

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# DESCRIPTION OF INDUSTRIES AND SUMMARY OF FINDINGS

## PETROLEUM AND COAL PRODUCTS

This report shows 1982 Census of Manufactures statistics for establishments classified in each of the following industries:

### SIC Code and Title

2911	Petroleum Refining
2951	Paving Mixtures and Blocks
2952	Asphalt Felts and Coatings
2992	Lubricating Oils and Greases
2999	Petroleum and Coal Products, N.E.C.

The industry statistics (employment, payroll, cost of materials, value of shipments, inventories, etc.) are reported for each establishment as a whole. Aggregates of such data for an industry reflect not only the primary activities of the establishments but also their activities in the manufacture of secondary products as well as their miscellaneous activities (contract work on materials owned by others, repair work, etc.). This fact should be taken into account in comparing industry statistics (table 1a-5a) with product statistics (table 6a-1) showing shipments by all industries of the primary products of the specified industry. The extent of the "product mix" is indicated in table 5b, which shows the value of primary and secondary products shipped by establishments classified in the specified industry and the value of primary products of the industry shipped as secondary products by establishments classified in other industries.

Small single-unit companies with up to 20 employees (cutoff varied by industry) were excluded from the mail portion of the census. For these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated), data on payrolls and receipts were obtained from administrative records of other government agencies. The remaining statistics were developed from industry averages.

Establishment data were tabulated based on industry definitions contained in the 1972 Standard Industrial Classification (SIC) Manual and its 1977 supplement.<sup>1</sup>

## INDUSTRY 2911, PETROLEUM REFINING

This industry comprises establishments primarily engaged in the manufacture of gasoline, kerosene, distillate and residual fuel oils, lubricants, and other products from crude petroleum and its fractionation products through straight distillation of crude oil, redistillation of unfinished petroleum derivatives, and cracking or other processes. Establishments primarily engaged in producing natural gasoline from natural gas are classified in mining industries. Establishments primarily engaged in the manufacture

of lubricating oils and greases by blending and compounding purchased materials, and those primarily re-refining used lubricating oils, are included in industry 2992. Industry 2911 also includes establishments primarily engaged in the production of petroleum-based chemicals (petrochemicals). Detailed product statistics for liquefied refinery gases used as chemical raw material were not collected since these data are reported to the U.S. International Trade Commission and published in the report, Synthetic Organic Chemicals, United States Production and Sales.

Unlike most manufacturing industries where the receipts for contract work are reported as such, plants in industry 2911 processing oil on a contract basis for other companies were requested to report the commercial cost of all materials received and the market values, f.o.b. plant, for the products shipped.

Petroleum product statistics shown in this report are not directly comparable with the Bureau of Mines figures published in the Minerals Yearbook. The census of manufactures collects data on shipments, whereas the Bureau of Mines figures are in terms of "output" (production).

In the 1982 Census of Manufactures, Industry 2911, Petroleum Refining, recorded employment of 108.7 thousand. The total value of shipments for establishments classified in this industry was \$200 billion.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 6 percent above the 102.5 thousand reported in 1977. The leading States in employment in 1982 were Texas, California, Louisiana, and Pennsylvania, accounting for 64 percent of the industry's 1982 employment. These same States were the leaders in 1977, when they accounted for 63 percent of the industry's employment.

Compared with 1981, employment decreased less than 1 percent. The 1981 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 2911 shipped \$190 billion of products primary to the industry, \$3 billion of secondary products, and had \$7 billion of miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 99 percent (specialization ratio). In 1977, this specialization ratio also was 99 percent.

Establishments in this industry also accounted for 98 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 97 percent. The products primary to industry

<sup>1</sup>Standard Industrial Classification Manual: 1972. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. Stock No. 041-001-00066-6. 1977 Supplement. Stock No. 003-005-00176-0.

2911, no matter in what industry they were produced, appear in table 6a-1 and aggregate to \$194 billion in current prices.

Certain products primary to industry 2911 are also primary to Industry 2992, Lubricating Oils and Greases. Table 6a-1 shows the data on a combined "wherever-made" basis to provide the product totals regardless of the industry classification of the establishment from which they were shipped. Table 6a-2 provides a breakdown of the products showing the industry in which the products are primary.

The total cost of materials and services used by establishments classified in the petroleum refining industry amounted to \$179 billion in current prices. Data on specific materials consumed appear in table 7.

No establishments in this industry were excluded from the mail portion of the census. The data for a small number of establishments whose reports were not received at the time the data were tabulated were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 3 percent of total value of shipments.

## INDUSTRY 2951, PAVING MIXTURES AND BLOCKS

This industry comprises establishments primarily engaged in the manufacture of asphalt and tar paving mixtures; and paving blocks made of asphalt, creosoted wood, and various compositions of asphalt or tar with other materials. Establishments primarily engaged in the manufacture of brick, concrete, granite, and stone paving blocks are classified in major group 32.

In the 1982 Census of Manufactures, Industry 2951, Paving Mixtures and Blocks, recorded employment of 15.2 thousand. The total value of shipments for establishments classified in this industry was \$3.1 billion.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 18 percent above the 12.9 thousand reported in 1977. The leading States in employment in 1982 were New York, Pennsylvania, California, and Washington, accounting for approximately 30 percent of the industry's 1982 employment. Data for New York have been withheld to avoid disclosing data for individual companies. This represents a shift from 1977 when New York, Ohio, Pennsylvania, and California accounted for approximately 35 percent of the industry's employment.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 2951 shipped \$2.8 billion of products primary to the industry, \$216 million of secondary products, and had \$125 million of miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 93 percent (specialization ratio). In 1977, this specialization ratio was 95 percent.

Establishments in this industry also accounted for 96 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 93 percent. The products primary to industry

2951, no matter in what industry they were produced, appear in table 6a-1 and aggregate to \$2.9 billion in current prices.

The total cost of materials and services used by establishments classified in the paving mixtures and blocks industry amounted to \$2.2 billion in current prices. Data on specific materials consumed appear in table 7.

Establishments of single-unit companies in this industry with up to 5 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 20 percent of total value of shipments.

## INDUSTRY 2952, ASPHALT FELTS AND COATINGS

This industry comprises establishments primarily engaged in the manufacture of asphalt and other saturated felts in roll or shingle form, either smooth or faced with grit; and roofing cements and coatings. Establishments primarily engaged in the manufacture of paint are classified in industry 2851, and linoleum and tile cement in industry 2891.

In the 1982 Census of Manufactures, Industry 2952, Asphalt Felts and Coatings, recorded employment of 14.2 thousand. The total value of shipments for establishments classified in this industry was \$2.8 billion.

The value of shipments figure shown above is in current (1982) prices. All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The employment figure shown above was 27 percent below the 19.5 thousand reported in 1977. The leading States in employment in 1982 were Texas, California, Ohio, and Illinois, accounting for approximately 38 percent of the industry's 1982 employment. These same States were the leaders in 1977, when they accounted for approximately 45 percent of the industry's employment, although there has been some shift in the relative importance of individual States.

Compared with 1981, employment decreased 17 percent. The 1981 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 2952 shipped \$2.6 billion of products primary to the industry, \$127 million of secondary products, and had \$142 million of miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 95 percent (specialization ratio). In 1977, this specialization ratio was 91 percent.

Establishments in this industry also accounted for 98 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 97 percent. The products primary to industry 2952, no matter in what industry they were produced, appear in table 6a-1 and aggregate to \$2.6 billion in current prices.

The total cost of materials and services used by establishments classified in the asphalt felts and coatings industry amounted to \$2.0 billion in current prices. Data on specific materials consumed appear in table 7.

Establishments of single-unit companies in this industry with up to 5 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 4 percent of total value of shipments.

## **INDUSTRY 2992, LUBRICATING OILS AND GREASES**

This industry comprises establishments primarily in the blending, compounding, and re-refining of lubricating oils and greases from purchased mineral, animal, and vegetable materials. Lubricating oils, lubricating oil base stocks, and lubricating greases produced by petroleum refineries are classified in industry 2911.

In the 1982 Census of Manufactures, Industry 2992, Lubricating Oils and Greases, recorded employment of 11.9 thousand. The total value of shipments for establishments classified in this industry was \$2.9 billion.

The employment figure shown above was 16 percent above the 10.3 thousand reported in 1977. The leading States in employment in 1982 were Pennsylvania, California, Illinois, and Texas, accounting for approximately 45 percent of the industry's 1982 employment. Data for Pennsylvania and Texas have been withheld to avoid disclosing data for individual companies. This represents a shift from 1977 when Pennsylvania, Illinois, California, and Ohio accounted for approximately 50 percent of the industry's employment.

Compared with 1981, employment decreased 7 percent. The 1981 data are based on the Bureau's annual survey of manufactures (ASM), which is a sample survey conducted each year between censuses.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 2992 shipped \$2.6 billion of products primary to the industry, \$156 million of secondary products, and had \$144 million of miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 94 percent (specialization ratio). In 1977, this specialization ratio also was 94 percent.

Establishments in this industry also accounted for 46 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 44 percent. The products primary to industry 2992, no matter in what industry they were produced, appear in table 6a-1 and aggregate to \$5.6 billion in current prices.

Certain products primary to industry 2992 are also primary to Industry 2911, Petroleum Refining. Table 6a-1 shows the data on a combined "wherever-made" basis to provide the product totals regardless of the industry classification of the establishment from which they were shipped. Table 6a-2 provides a breakdown of the products showing the industry in which the products are primary.

The total cost of materials and services used by establishments classified in the lubricating oils and greases industry amounted to \$1.9 billion in current prices. Data on specific materials consumed appear in table 7.

Establishments of single-unit companies in this industry with up to 5 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 20 percent of total value of shipments.

## **INDUSTRY 2999, PETROLEUM AND COAL PRODUCTS, N.E.C.**

This industry comprises establishments primarily engaged in the manufacture of fuel briquets, packaged fuel, powdered fuel, re-refined fuel oil, and other products of petroleum and coal, not elsewhere classified.

In the 1982 Census of Manufactures, Industry 2999, Petroleum and Coal Products, N.E.C., recorded employment of 2.0 thousand. The total value of shipments for establishments classified in this industry was \$739 million.

The employment figure shown above was 25 percent above the 1.6 thousand reported in 1977. The leading States in employment in 1982 were California, Pennsylvania, Louisiana, and Texas, accounting for approximately 60 percent of the industry's 1982 employment. Data for Pennsylvania and Texas have been withheld to avoid disclosing data for individual companies. This represents a shift from 1977 when California, Illinois, Ohio, and Texas accounted for approximately 60 percent of the industry's employment.

Establishments in virtually all industries ship secondary products as well as products primary to the industry to which they are classified and have some miscellaneous receipts, such as resales and contract receipts. In current prices, industry 2999 shipped \$623 million of products primary to the industry, \$39 million of secondary products, and had \$76 million of miscellaneous receipts. Thus, the ratio of primary products to the total of both secondary and primary products shipped by establishments in the industry was 94 percent (specialization ratio). In 1977, this specialization ratio was 97 percent.

Establishments in this industry also accounted for 89 percent of products considered primary to the industry no matter where they actually were produced (coverage ratio). In 1977, the coverage ratio was 87 percent. The products primary to industry 2999, no matter in what industry they were produced, appear in table 6a-1 and aggregate to \$700 million in current prices.

The total cost of materials and services used by establishments classified in the petroleum and coal products, n.e.c., industry amounted to \$561 million in current prices.

Establishments of single-unit companies in this industry with up to 5 employees were excluded from the mail portion of the census. The data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were obtained from administrative records of other agencies or developed from industry averages. These establishments accounted for 10 percent of total value of shipments.

Table 1a. Historical Statistics for the Industry: 1982 and Earlier Years

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year <sup>1</sup>	All establishments <sup>3</sup>			All employees		Production workers			Value added by manufacture <sup>4</sup> (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	End-of-year inventories <sup>4</sup> (million dollars)	Ratios	
	Companies <sup>2</sup> (no.)	Total (no.)	With 20 employees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						Specialization (percent)	Coverage (percent)
INDUSTRY 2911, PETROLEUM REFINING															
1982 Census	283	434	313	108.7	3 410.3	71.3	148.4	2 065.1	19 204.3	178 947.0	199 722.8	6 412.3	16 280.1	99	98
1981 ASM	(NA)	(NA)	(NA)	108.8	3 188.1	72.6	151.7	2 008.8	24 149.0	191 350.8	215 056.1	4 942.7	9 686.0	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	102.7	2 751.3	69.5	136.8	1 629.9	22 146.9	169 668.8	190 103.1	3 377.6	9 178.8	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	108.3	2 562.9	72.8	151.5	1 657.8	26 176.7	116 062.2	140 371.6	3 069.8	7 074.8	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	101.7	2 226.7	70.2	147.2	1 485.8	13 707.9	82 842.0	96 806.7	2 070.5	4 963.0	(NA)	(NA)
1977 Census	191	349	279	102.5	2 055.3	70.8	144.4	1 366.4	14 423.9	77 854.6	91 688.8	2 108.6	5 196.2	99	97
1976 ASM	(NA)	(NA)	(NA)	101.7	1 886.9	70.9	145.4	1 245.9	11 409.6	66 303.0	77 507.3	2 656.1	4 801.8	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	101.0	1 665.8	70.2	138.9	1 063.4	8 927.2	56 553.9	65 254.2	2 275.2	4 395.3	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	102.9	1 461.8	73.2	146.2	952.8	8 363.5	47 616.9	54 833.8	1 716.3	3 770.1	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	98.0	1 303.1	68.6	134.8	845.1	6 518.5	25 606.8	31 845.8	1 012.5	2 365.5	(NA)	(NA)
1972 Census	154	323	277	100.8	1 247.1	71.2	142.3	816.3	4 594.7	21 171.3	25 921.1	1 061.6	2 002.2	99	97
1971 ASM	(NA)	(NA)	(NA)	106.7	1 230.0	74.3	148.7	794.2	4 613.8	20 091.9	24 583.7	1 232.3	2 228.6	(NA)	(NA)
1970 ASM	(NA)	(NA)	(NA)	107.7	1 161.2	75.4	152.7	753.3	4 607.9	18 258.1	22 783.3	1 151.9	2 130.8	(NA)	(NA)
1969 ASM	(NA)	(NA)	(NA)	108.0	1 090.8	75.6	146.5	685.7	4 949.8	17 567.6	22 486.4	1 023.4	2 028.2	(NA)	(NA)
1968 ASM	(NA)	(NA)	(NA)	107.1	1 024.9	75.4	152.3	665.5	4 838.8	16 555.3	21 361.2	1 019.3	1 976.6	(NA)	(NA)
1967 Census	276	437	287	106.7	965.0	75.6	151.6	632.2	4 745.0	15 683.7	20 293.9	956.3	1 904.3	98	97
INDUSTRY 2951, PAVING MIXTURES AND BLOCKS															
1982 Census	569	1 034	202	15.2	340.5	11.1	22.2	229.1	925.9	2 162.4	3 098.6	76.1	162.1	93	96
1981 ASM	(NA)	(NA)	(NA)	12.0	248.1	8.7	17.3	161.3	705.7	1 515.8	2 222.8	44.7	103.0	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	12.6	249.7	9.2	18.9	162.9	727.8	1 523.7	2 244.7	55.3	103.1	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	12.9	236.5	9.7	20.3	165.2	660.8	1 372.0	2 026.6	62.1	87.1	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	13.5	251.0	10.5	22.4	180.1	750.8	1 333.6	2 070.4	59.6	110.9	(NA)	(NA)
1977 Census	590	1 023	165	12.9	190.6	9.7	20.2	134.3	507.8	1 072.1	1 578.3	57.3	62.8	95	93
1976 ASM	(NA)	(NA)	(NA)	12.9	159.5	9.6	18.6	105.7	450.8	795.9	1 250.6	56.2	51.1	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	13.0	156.4	9.7	20.8	105.5	428.4	781.2	1 237.2	51.3	54.0	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	14.7	147.9	9.4	20.6	102.2	468.2	772.7	1 234.0	54.8	51.1	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	12.4	141.7	9.1	19.3	98.3	388.5	574.0	967.5	54.4	27.2	(NA)	(NA)
1972 Census	586	964	169	13.9	147.7	10.0	21.4	100.8	403.1	527.2	922.5	56.3	38.5	93	90
1971 ASM	(NA)	(NA)	(NA)	12.4	126.2	7.9	16.5	75.7	345.2	464.6	803.6	35.3	30.4	(NA)	(NA)
1970 ASM	(NA)	(NA)	(NA)	12.9	117.2	8.8	18.7	72.3	320.4	417.8	738.4	30.4	27.4	(NA)	(NA)
1969 ASM	(NA)	(NA)	(NA)	11.6	97.9	7.9	17.8	64.1	260.9	380.2	641.5	27.9	22.7	(NA)	(NA)
1968 ASM	(NA)	(NA)	(NA)	11.6	89.4	8.2	16.8	58.3	243.8	370.5	610.9	23.0	22.9	(NA)	(NA)
1967 Census	553	872	155	12.2	90.0	8.5	18.0	58.4	234.7	350.1	584.6	23.8	19.7	93	95
INDUSTRY 2952, ASPHALT FELTS AND COATINGS															
1982 Census	147	273	155	14.2	288.7	10.4	21.0	195.1	816.9	1 993.7	2 849.5	57.1	256.9	95	98
1981 ASM	(NA)	(NA)	(NA)	17.1	334.3	12.4	25.6	228.2	803.1	2 118.2	2 885.5	58.1	325.6	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	18.7	334.5	13.4	28.7	229.1	904.6	2 011.5	2 884.7	67.9	271.4	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	22.4	374.1	16.5	35.5	256.3	1 020.5	1 937.5	2 921.9	70.7	236.1	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	21.2	329.9	15.9	35.1	228.0	985.7	1 666.7	2 651.3	70.0	176.9	(NA)	(NA)
1977 Census	146	275	164	19.5	271.7	14.3	31.0	185.9	764.2	1 320.8	2 077.6	55.2	157.2	91	97
1976 ASM	(NA)	(NA)	(NA)	18.9	230.9	13.7	29.6	156.9	733.4	1 169.3	1 894.0	52.1	138.6	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	16.6	188.1	12.2	26.4	128.7	636.8	980.0	1 606.4	33.9	121.5	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	17.3	184.6	12.8	28.8	129.0	623.3	908.9	1 504.2	35.4	110.6	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	16.7	168.9	12.6	28.7	119.1	487.5	651.0	1 146.7	26.8	64.1	(NA)	(NA)
1972 Census	117	235	140	15.6	148.7	11.5	26.4	103.2	443.3	573.5	1 010.4	19.6	64.7	93	96
1971 ASM	(NA)	(NA)	(NA)	14.4	127.8	10.4	23.7	87.3	376.1	508.0	879.8	15.8	54.8	(NA)	(NA)
1970 ASM	(NA)	(NA)	(NA)	14.2	114.8	10.2	23.0	78.3	259.9	431.5	691.2	11.8	50.1	(NA)	(NA)
1969 ASM	(NA)	(NA)	(NA)	13.8	109.5	9.9	23.3	75.5	249.2	404.7	654.7	8.8	47.6	(NA)	(NA)
1968 ASM	(NA)	(NA)	(NA)	14.0	102.8	10.1	22.9	70.8	241.5	394.9	633.4	13.1	46.2	(NA)	(NA)
1967 Census	115	226	138	14.4	96.3	10.4	22.9	66.2	221.1	373.8	597.8	8.8	42.4	91	95
INDUSTRY 2992, LUBRICATING OILS AND GREASES															
1982 Census	401	473	153	11.9	266.2	5.6	11.3	102.3	902.6	1 949.5	2 875.3	67.8	364.1	94	46
1981 ASM	(NA)	(NA)	(NA)	12.8	266.1	6.4	12.5	103.5	851.8	2 257.9	3 086.9	67.7	296.1	(NA)	(NA)
1980 ASM	(NA)	(NA)	(NA)	13.3	248.0	6.7	13.4	95.7	799.3	1 979.8	2 751.4	57.3	267.7	(NA)	(NA)
1979 ASM	(NA)	(NA)	(NA)	12.4	216.7	6.2	12.8	92.6	827.7	1 660.8	2 464.0	36.1	219.3	(NA)	(NA)
1978 ASM	(NA)	(NA)	(NA)	10.2	169.3	5.4	10.3	72.7	701.3	1 168.8	1 864.6	41.7	179.7	(NA)	(NA)
1977 Census	417	490	143	10.3	157.1	5.4	10.4	65.4	524.8	1 101.0	1 644.7	25.6	180.8	94	44
1976 ASM	(NA)	(NA)	(NA)	9.9	140.3	5.2	10.5	59.5	469.2	929.8	1 389.1	528.1	177.2	(NA)	(NA)
1975 ASM	(NA)	(NA)	(NA)	9.7	125.9	5.1	10.0	51.7	405.1	773.5	1 175.2	541.2	150.0	(NA)	(NA)
1974 ASM	(NA)	(NA)	(NA)	9.6	113.3	5.1	10.4	48.3	412.6	723.9	1 101.9	536.6	144.1	(NA)	(NA)
1973 ASM	(NA)	(NA)	(NA)	8.3	91.1	4.5	9.1	39.9	285.1	491.1	781.5	10.3	83.4	(NA)	(NA)
1972 Census	387	443	117	8.1	83.3	4.4	8.6	36.2	295.8	408.9	703.1	13.7	80.9	94	40
1971 ASM	(NA)	(NA)	(NA)	6.4	68.1	3.2	6.4	27.5	233.8	317.6	544.2	10.4	70.3	(NA)	(NA)
1970 ASM	(NA)	(NA)	(NA)	7.7	74.0	4.0	8.2	29.6	249.6	306.8	551.0	13.8	65.7	(NA)	(NA)
1969 ASM	(NA)	(NA)	(NA)	7.8	75.0	4.1	8.4	30.3	255.2	307.1	553.5	13.5	64.2	(NA)	(NA)
1968 ASM	(NA)	(NA)	(NA)	7.1	59.3	3.8	7.4	24.6	215.0	285.7	499.2	8.0	55.5	(NA)	(NA)
1967 Census	256	298	109	7.3	58.0	3.9	7.9	24.3	200.7	284.6	487.3				

See footnotes at end of table.

**Table 1a. Historical Statistics for the Industry: 1982 and Earlier Years—Con.**

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year <sup>1</sup>	Com- panies <sup>2</sup> (no.)	All establishments <sup>3</sup>		All employees		Production workers			Value added by manufac- ture <sup>4</sup> (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expendi- tures (million dollars)	End-of- year invent- ories <sup>4</sup> (million dollars)	Ratios	
		Total (no.)	With 20 employ- ees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						Speci- alization (per- cent)	Cover- age (per- cent)
	INDUSTRY 2999, PETROLEUM AND COAL PRODUCTS, N.E.C.—Con.														
1972 Census-----	42	51	17	1.1	10.6	.9	1.8	7.5	56.3	81.6	137.6	3.0	36.7	99	91
1971 ASM-----	(NA)	(NA)	(NA)	1.5	12.0	1.2	2.3	8.7	47.9	78.6	123.8	10.3	23.6	(NA)	(NA)
1970 ASM-----	(NA)	(NA)	(NA)	1.5	10.9	1.2	2.2	8.1	40.0	79.4	119.0	9.7	17.0	(NA)	(NA)
1969 ASM-----	(NA)	(NA)	(NA)	1.3	8.5	1.0	2.0	6.3	30.8	63.9	94.4	.7	13.8	(NA)	(NA)
1968 ASM-----	(NA)	(NA)	(NA)	1.2	7.9	.9	1.9	5.9	28.0	57.9	85.3	1.5	12.1	(NA)	(NA)
1967 Census-----	38	47	15	1.1	6.9	.8	1.7	5.2	24.4	56.2	79.8	1.8	10.0	99	92

<sup>1</sup>In annual survey of manufactures (ASM) years, data are estimates based on a representative sample of establishments canvassed annually and may differ from results of a complete canvass of all establishments. ASM publication shows percentage standard errors. Unless otherwise noted, for data prior to 1967, see 1967 Census of Manufactures, vol. II, table 1 of the Industry chapter.

<sup>2</sup>For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

<sup>3</sup>Includes establishments with payroll at any time during year.

<sup>4</sup>Effective with the 1982 Economic Censuses, uniform instructions for reporting inventories were introduced for all sector reports. Up to 1982, respondents were permitted to value inventories using any generally accepted accounting method (FIFO, LIFO, market, to name a few). In 1982, LIFO users were asked to first report inventory values prior to the LIFO adjustment and then to report the LIFO reserve and the LIFO value after adjustment for the reserve.

Because of this change in reporting instructions, the 1982 data for inventories and value added by manufacture included in the tables of this report are not comparable to the prior-year data shown above and in historical census of manufactures and annual survey of manufactures publications. Inventories and value added data estimated on a basis comparable to the historical data, using the reported information for 1982, are shown below:

Industries	End-of-1981 inventories (million dollars)	End-of-1982 inventories (million dollars)	1982 value added by manufacture (million dollars)
Industry 2911, Petroleum refining.....	10 356.9	10 685.6	20 336.4
Industry 2951, Paving mixtures and blocks.....	149.8	136.8	931.4
Industry 2952, Asphalt felts and coatings.....	300.3	250.2	817.7
Industry 2992, Lubricating oils and greases.....	341.6	319.6	912.8
Industry 2999, Petroleum and coal products, n.e.c.---	175.5	175.7	177.7

See Inventories in appendixes for explanation of the difference between end-of-1981 inventory figure shown in table and corresponding figure shown in footnote.

<sup>5</sup>Estimate for new capital expenditures has associated standard error of 15 percent or more and may be of limited reliability. Estimates for other data items are of acceptable reliability.

**Table 1b. Selected Operating Ratios for the Industry: 1982 and Earlier Years**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
<b>INDUSTRY 2911, PETROLEUM REFINING</b>									
1982 Census.....	31 374	66	2 081	13.92	90	91	176 672	18	129.41
1981 ASM.....	29 302	67	2 090	13.24	89	90	221 958	13	159.19
1980 ASM.....	26 790	68	1 968	11.91	89	91	215 647	12	161.89
1979 ASM.....	23 665	67	2 081	10.94	83	85	241 705	10	172.78
1978 ASM.....	21 895	69	2 097	10.09	86	88	134 788	16	93.12
1977 Census.....	20 052	69	2 040	9.46	85	87	140 721	14	99.89
1976 ASM.....	18 554	70	2 051	8.57	86	88	112 189	17	78.47
1975 ASM.....	16 493	70	1 979	7.66	87	89	88 388	19	64.27
1974 ASM.....	14 206	71	1 997	6.52	87	90	81 278	17	57.21
1973 ASM.....	13 297	70	1 965	6.27	80	85	66 515	20	48.36
1972 Census.....	12 372	71	1 999	5.74	82	86	45 582	27	32.29
1971 ASM.....	11 528	70	2 001	5.34	82	87	43 241	27	31.03
1970 ASM.....	10 782	70	2 025	4.93	80	85	42 785	25	30.18
1969 ASM.....	10 100	70	1 938	4.68	78	83	45 831	22	33.79
1968 ASM.....	9 570	70	2 020	4.37	78	82	45 180	21	31.77
1967 Census.....	9 044	71	2 005	4.17	77	82	44 470	20	31.30
<b>INDUSTRY 2951, PAVING MIXTURES AND BLOCKS</b>									
1982 Census.....	22 401	73	2 000	10.32	70	81	60 914	37	41.71
1981 ASM.....	20 675	72	1 989	9.32	68	79	58 808	35	40.79
1980 ASM.....	19 817	73	2 054	8.62	68	79	57 762	34	38.51
1979 ASM.....	18 333	75	2 093	8.14	68	79	51 225	36	32.55
1978 ASM.....	18 593	78	2 133	8.04	64	77	55 615	33	33.52
1977 Census.....	14 775	75	2 082	6.65	68	80	39 364	38	25.14
1976 ASM.....	12 364	74	1 938	5.68	64	76	34 946	35	24.24
1975 ASM.....	12 031	75	2 144	5.07	63	76	32 954	37	20.60
1974 ASM.....	10 061	64	2 191	4.96	63	75	31 850	32	22.73
1973 ASM.....	11 427	73	2 121	5.09	59	74	31 331	36	20.13
1972 Census.....	10 626	72	2 140	4.71	57	73	29 000	37	18.84
1971 ASM.....	10 177	64	2 089	4.59	58	74	27 839	37	20.92
1970 ASM.....	9 085	68	2 125	3.87	57	72	24 837	37	17.13
1969 ASM.....	8 440	68	2 253	3.60	59	75	22 491	38	14.66
1968 ASM.....	7 707	71	2 049	3.47	61	75	21 017	37	14.51
1967 Census.....	7 377	70	2 118	3.24	60	75	19 238	38	13.04

See footnotes at end of table.

**Table 1b. Selected Operating Ratios for the Industry: 1982 and Earlier Years—Con.**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Year	Payroll per employee (dollars)	Production workers as percent of total employment (percent)	Annual hours of production workers (number)	Average hourly earnings of production workers (dollars)	Cost of materials as percent of value of shipments (percent)	Cost of materials and payroll as percent of value of shipments (percent)	Value added per employee (dollars)	Payroll as percent of value added (percent)	Value added per production worker hour (dollars)
<b>INDUSTRY 2952, ASPHALT FELTS AND COATINGS</b>									
1982 Census.....	20 331	73	2 019	9.29	70	80	57 528	35	38.90
1981 ASM.....	19 550	73	2 065	8.91	73	85	49 965	42	31.37
1980 ASM.....	17 888	72	2 142	7.98	70	81	48 374	37	31.52
1979 ASM.....	16 701	74	2 152	7.22	66	79	45 558	37	28.75
1978 ASM.....	15 561	75	2 208	6.50	63	75	46 495	33	28.08
1977 Census.....	13 933	73	2 168	6.00	64	77	39 190	36	24.65
1976 ASM.....	12 534	72	2 161	5.30	62	74	38 804	32	24.78
1975 ASM.....	11 331	73	2 164	4.88	61	73	38 361	30	24.12
1974 ASM.....	10 671	74	2 250	4.48	60	73	36 029	30	21.64
1973 ASM.....	10 114	75	2 278	4.15	57	72	29 192	35	16.99
1972 Census.....	9 532	74	2 296	3.91	57	71	28 417	34	16.79
1971 ASM.....	8 875	72	2 279	3.68	58	72	26 118	34	15.87
1970 ASM.....	8 085	72	2 255	3.40	62	79	18 303	44	11.30
1969 ASM.....	7 935	72	2 354	3.24	62	79	18 058	44	10.70
1968 ASM.....	7 343	72	2 267	3.09	62	79	17 250	43	10.55
1967 Census.....	6 688	72	2 202	2.89	63	79	15 354	44	9.66
<b>INDUSTRY 2992, LUBRICATING OILS AND GREASES</b>									
1982 Census.....	22 370	47	2 018	9.05	68	77	75 849	29	79.88
1981 ASM.....	20 789	50	1 953	8.28	73	82	66 547	31	68.14
1980 ASM.....	18 647	50	2 000	7.14	72	81	60 098	31	59.65
1979 ASM.....	17 476	50	2 065	7.23	67	76	66 750	26	64.66
1978 ASM.....	16 598	53	1 907	7.06	63	72	68 755	24	68.09
1977 Census.....	15 252	52	1 926	6.29	67	76	50 951	30	50.46
1976 ASM.....	14 172	53	2 019	5.67	67	77	47 394	30	44.69
1975 ASM.....	12 979	53	1 961	5.17	66	77	41 763	31	40.51
1974 ASM.....	11 802	53	2 039	4.64	66	76	42 979	27	39.67
1973 ASM.....	10 976	54	2 022	4.38	63	74	34 349	32	31.33
1972 Census.....	10 284	54	1 955	4.21	58	70	36 519	28	34.40
1971 ASM.....	10 641	50	2 000	4.30	58	71	36 531	29	36.53
1970 ASM.....	9 610	52	2 050	3.61	56	69	32 416	30	30.44
1969 ASM.....	9 615	53	2 049	3.61	55	69	32 718	29	30.38
1968 ASM.....	8 352	54	1 947	3.32	57	69	30 282	28	29.05
1967 Census.....	7 945	53	2 026	3.08	58	70	27 493	29	25.41
<b>INDUSTRY 2999, PETROLEUM AND COAL PRODUCTS, N.E.C.</b>									
1982 Census.....	22 750	70	2 000	10.25	76	82	88 200	26	63.00
1981 ASM.....	24 813	63	1 900	10.68	74	79	144 250	17	121.47
1980 ASM.....	19 750	63	1 900	9.11	66	71	148 063	13	124.68
1979 ASM.....	18 533	67	2 000	8.35	72	77	107 467	17	80.60
1978 ASM.....	15 125	75	2 000	6.83	67	72	97 125	16	64.75
1977 Census.....	14 063	69	1 909	6.76	66	71	98 125	14	74.76
1976 ASM.....	13 100	80	1 875	6.47	63	68	105 900	12	70.60
1975 ASM.....	12 556	78	2 000	5.71	52	57	113 444	11	72.93
1974 ASM.....	11 182	82	2 111	4.53	58	65	75 909	15	43.95
1973 ASM.....	9 333	83	1 800	4.44	62	69	50 250	19	33.50
1972 Census.....	9 636	82	2 000	4.17	59	67	51 182	19	31.28
1971 ASM.....	8 000	80	1 917	3.78	63	73	31 933	25	20.83
1970 ASM.....	7 267	80	1 833	3.68	67	76	26 667	27	18.18
1969 ASM.....	6 538	77	2 000	3.15	68	77	23 692	28	15.40
1968 ASM.....	6 583	75	2 111	3.11	68	77	23 333	28	14.74
1967 Census.....	6 273	73	2 125	3.06	70	79	22 182	28	14.35

Note: For qualifications of data, see footnotes on table 1a.

**Table 2. Industry Statistics for Selected States: 1982 and 1977**

[Excludes data for auxiliaries. Includes data for States with 150 employees or more. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1982												1977	
	E <sup>1</sup>	All establishments <sup>2</sup>		All employees		Production workers			Value added by manufacture <sup>4</sup> (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employees <sup>3</sup> (1,000)	Value added by manufacture (million dollars)
		Total (no.)	With 20 employees or more (no.)	Number <sup>3</sup> (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						
<b>INDUSTRY 2911, PETROLEUM REFINING</b>														
United States .....	-	434	313	108.7	3 410.3	71.3	148.4	2 065.1	19 204.3	178 947.0	199 722.8	6 412.3	102.5	14 423.9
Alabama .....	E4	6	5	.5	14.1	.4	.9	9.7	33.7	1 101.4	1 180.9	(D)	.5	46.3
Alaska .....	-	5	4	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Arizona .....	E9	3	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Arkansas .....	-	6	4	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
California .....	-	49	36	14.5	468.1	9.1	19.2	271.5	3 813.8	20 317.3	24 343.8	1 002.2	14.7	2 315.2
Colorado .....	E2	5	4	.5	15.2	.4	.8	11.0	38.6	940.7	979.9	31.3	BB	(D)
Delaware .....	-	2	2	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Hawaii .....	-	2	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Illinois .....	-	14	10	5.9	185.2	4.1	8.6	121.7	916.3	10 091.4	11 030.8	81.5	6.5	1 248.7
Indiana .....	-	8	7	FF	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	3.2	279.3
Kansas .....	-	12	11	3.4	91.0	2.2	4.9	59.5	195.2	5 165.1	5 570.8	61.6	3.3	331.2
Kentucky .....	-	5	3	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Louisiana .....	-	44	34	12.6	426.3	7.7	15.9	236.4	2 358.6	27 915.6	30 638.0	1 241.2	9.5	1 745.1
Michigan .....	-	8	6	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	1.1	130.8
Minnesota .....	-	5	3	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Mississippi .....	-	8	8	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Missouri .....	-	1	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Montana .....	-	7	6	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
New Jersey .....	-	10	9	4.7	155.6	3.0	6.7	93.2	435.5	6 711.3	7 124.1	(D)	4.0	101.2
New Mexico .....	E2	6	5	.7	20.9	.4	1.0	12.3	269.6	1 085.2	1 340.4	21.7	BB	(D)
New York .....	-	4	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
North Dakota .....	-	2	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Ohio .....	-	14	9	2.5	81.1	1.7	3.4	54.2	874.5	5 739.8	6 620.8	60.6	2.6	456.6
Oklahoma .....	-	22	15	3.9	114.1	2.8	5.9	80.8	570.8	5 938.6	6 432.9	64.2	3.9	405.4
Pennsylvania .....	-	26	16	6.6	205.8	4.3	8.9	133.9	499.6	9 103.8	9 860.2	125.3	7.6	939.5
Tennessee .....	-	2	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Texas .....	-	93	65	36.1	1 123.7	24.1	49.2	658.7	4 465.6	54 596.4	59 535.4	2 423.2	32.4	4 075.2
Utah .....	-	11	7	.9	25.2	.6	1.2	16.4	217.7	1 424.9	1 645.5	19.1	.8	98.1
Virginia .....	-	2	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Washington .....	-	6	6	1.6	54.7	1.1	2.2	32.7	561.0	3 858.0	4 432.5	75.5	1.5	46.7
West Virginia .....	-	4	4	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Wisconsin .....	-	3	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Wyoming .....	E1	12	8	1.0	31.4	.7	1.7	21.7	23.2	1 638.1	1 738.4	(D)	EE	(D)
<b>INDUSTRY 2951, PAVING MIXTURES AND BLOCKS</b>														
United States .....	E1	1 034	202	15.2	340.5	11.1	22.2	229.1	925.9	2 162.4	3 098.6	76.1	12.9	507.8
Alabama .....	E1	18	5	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.3	11.0
Arizona .....	E2	12	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
California .....	E1	111	14	1.2	34.4	.8	1.6	22.0	98.1	247.8	345.2	9.9	.7	44.0
Connecticut .....	-	26	2	.5	10.9	.3	.6	6.9	45.1	69.5	114.8	2.6	BB	(D)
Florida .....	E5	31	16	.8	14.8	.7	1.5	10.2	32.2	79.3	112.0	3.0	.4	9.9
Georgia .....	E1	33	1	.2	3.2	.2	.3	2.4	13.1	57.0	71.7	1.7	.2	6.5
Illinois .....	E2	29	3	.3	6.4	.2	.4	4.8	22.6	59.6	82.0	4.1	.4	17.0
Indiana .....	E1	29	7	.5	11.1	.3	.6	7.4	26.9	41.1	68.1	.4	.5	23.1
Kansas .....	E1	11	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Kentucky .....	E2	22	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Maine .....	-	12	5	.3	6.0	.3	.6	4.5	21.2	19.5	40.4	.7	.4	10.9
Maryland .....	E4	27	6	.5	9.2	.3	.7	6.2	25.3	59.7	85.2	4.0	BB	(D)
Massachusetts .....	E3	39	7	.6	15.5	.4	.9	11.0	48.7	70.8	119.4	2.0	CC	(D)
Minnesota .....	-	17	4	.2	5.2	.2	.3	4.0	12.2	25.9	38.1	(D)	.2	6.5
Missouri .....	-	25	8	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.2	10.4
New Jersey .....	E1	32	6	.7	15.0	.5	1.2	10.5	47.6	81.1	128.4	2.4	.4	17.8
New York .....	E1	121	24	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	EE	(D)
Ohio .....	E1	97	15	1.0	20.4	.7	1.5	14.5	53.2	196.5	257.8	5.8	1.1	41.8
Oklahoma .....	E2	15	3	.2	4.5	.2	.3	2.9	11.8	22.0	33.9	(D)	(NA)	(NA)
Oregon .....	E2	12	4	.2	5.3	.2	.3	3.6	7.7	16.5	24.3	.1	.3	11.6
Pennsylvania .....	E2	85	13	1.2	26.4	.8	1.7	14.6	55.4	146.5	202.0	4.8	1.1	33.7
Tennessee .....	-	30	8	.4	8.5	.3	.7	6.0	20.9	59.7	80.9	(D)	BB	(D)
Texas .....	E1	31	9	.4	9.8	.3	.7	6.7	34.0	91.9	125.4	1.2	.3	11.9
Virginia .....	E1	17	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
Washington .....	-	8	6	1.1	26.6	.8	1.1	18.2	47.8	93.6	141.7	4.4	CC	(D)
Wisconsin .....	-	13	1	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.2	11.9

See footnotes at end of table.

**Table 2. Industry Statistics for Selected States: 1982 and 1977—Con.**

[Excludes data for auxiliaries. Includes data for States with 150 employees or more. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and geographic area	1982												1977	
	E¹	All establishments²		All employees		Production workers			Value added by manufacture⁴ (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)	All employ-ees³ (1,000)	Value added by manufac-ture (million dollars)
		Total (no.)	With 20 employ-ees or more (no.)	Number³ (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						
<b>INDUSTRY 2952, ASPHALT FELTS AND COATINGS</b>														
United States -----	-	273	155	14.2	288.7	10.4	21.0	195.1	816.9	1 993.7	2 849.5	57.1	19.5	764.2
Alabama -----	-	6	6	.6	13.1	.5	1.0	9.3	34.6	93.4	129.6	(D)	.6	21.9
Arkansas -----	-	7	6	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.8	17.9
California -----	-	31	16	1.4	29.3	1.0	2.1	21.3	82.0	214.2	304.5	5.3	1.6	68.3
Florida -----	-	14	6	.4	6.7	.3	.6	4.5	42.0	67.2	109.8	2.8	.3	12.4
Georgia -----	-	8	8	.6	12.7	.5	1.0	9.2	43.2	99.9	141.3	2.5	.6	33.1
Illinois -----	-	21	12	1.2	24.9	.9	1.6	17.2	46.4	162.9	221.0	2.5	2.4	88.6
Indiana -----	-	4	3	.3	7.0	.3	.6	5.5	25.9	49.2	74.2	1.8	.3	15.6
Kansas -----	-	1	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Louisiana -----	-	5	2	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.5	24.3
Maryland -----	-	6	5	.3	5.6	.2	.4	4.0	12.7	37.3	50.9	1.6	AA	(D)
Massachusetts -----	-	5	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Minnesota -----	-	6	4	.3	5.9	.3	.5	4.3	26.0	56.2	85.0	1.5	BB	(D)
Mississippi -----	-	1	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Missouri -----	-	9	3	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.6	34.3
New Jersey -----	-	13	11	1.1	23.5	.8	1.4	14.7	48.0	146.5	200.2	2.4	1.4	46.4
North Carolina -----	-	7	4	.3	6.3	.3	.6	4.9	16.9	64.8	81.1	1.0	AA	(D)
Ohio -----	-	28	15	1.2	26.4	.9	1.9	18.6	98.2	159.0	258.8	4.5	2.7	100.6
Oklahoma -----	-	5	2	.4	7.8	.3	.6	6.1	13.5	50.2	61.2	(D)	.6	11.7
Oregon -----	-	8	6	.3	8.3	.3	.4	6.0	21.2	44.9	65.8	(D)	.3	11.7
Pennsylvania -----	E2	12	5	.4	8.8	.3	.5	4.5	35.8	39.0	78.7	1.7	.8	36.4
South Carolina -----	E1	6	5	.4	7.4	.3	.5	4.3	20.3	55.1	75.8	(D)	BB	(D)
Tennessee -----	-	6	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.3	7.8
Texas -----	-	24	16	1.6	31.9	1.1	2.4	19.0	113.2	217.8	332.9	5.4	2.1	77.4
<b>INDUSTRY 2992, LUBRICATING OILS AND GREASES</b>														
United States -----	E1	473	153	11.9	266.2	5.6	11.3	102.3	902.6	1 949.5	2 875.3	67.8	10.3	524.8
California -----	E1	49	14	1.3	29.3	.5	1.0	9.3	107.8	180.1	287.1	16.4	1.1	68.6
Georgia -----	E4	8	4	.2	4.3	.1	.3	2.4	8.7	33.5	43.3	(D)	(NA)	(NA)
Illinois -----	E1	45	20	1.2	26.3	.5	1.1	10.1	71.1	229.8	304.2	9.9	1.3	103.7
Kansas -----	E3	10	7	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Louisiana -----	-	18	6	.6	15.1	.4	.9	8.7	113.8	234.1	361.9	4.7	CC	(D)
Maryland -----	E2	4	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Massachusetts -----	E1	12	4	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.2	13.6
Michigan -----	E2	35	10	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Minnesota -----	-	8	2	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
Missouri -----	E1	8	5	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Nebraska -----	E6	2	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(NA)	(NA)
New Jersey -----	-	23	12	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.7	43.3
New York -----	E2	20	4	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Ohio -----	E1	39	13	CC	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	CC	(D)
Oklahoma -----	E3	10	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Pennsylvania -----	-	37	17	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	1.4	48.6
Texas -----	E5	52	8	EE	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	BB	(D)
Wisconsin -----	-	10	3	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)
<b>INDUSTRY 2999, PETROLEUM AND COAL PRODUCTS, N.E.C.</b>														
United States -----	-	109	27	2.0	45.5	1.4	2.8	28.7	176.4	561.1	738.8	55.6	1.6	157.0
California -----	-	14	7	.4	7.4	.2	.5	4.3	53.8	102.2	159.5	1.0	.3	43.9
Louisiana -----	-	7	4	.2	7.7	.2	.3	5.3	28.3	148.8	177.3	11.3	(NA)	(NA)
Pennsylvania -----	E2	8	3	BB	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	.2	6.0
Texas -----	-	12	1	AA	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	AA	(D)

Note: For qualifications of data, see footnotes on table 1a.

<sup>1</sup>Payroll and sales data for some small single-unit companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate the items shown for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at time data were tabulated. The following symbols are shown for those States where estimated data based on administrative records data account for 10 percent or more of figures shown: E1—10 to 19 percent; E2—20 to 29 percent; E3—30 to 39 percent; E4—40 to 49 percent; E5—50 to 59 percent; E6—60 to 69 percent; E7—70 to 79 percent; E8—80 to 89 percent; E9—90 percent or more.

<sup>2</sup>Includes establishments with payroll at any time during year.

<sup>3</sup>Statistics for some producing States have been withheld to avoid disclosing data for individual companies. However, for States with 150 employees or more, number of establishments is shown and employment size range is indicated by one of the following symbols: AA—150 to 249 employees; BB—250 to 499 employees; CC—500 to 999 employees; EE—1,000 to 2,499 employees; FF—2,500 employees or more.

<sup>4</sup>Beginning in 1982, all respondents were requested to report their inventories at cost or market prior to adjustment to LIFO cost. This is a change from prior years in which respondents were permitted to value their inventories using any generally accepted accounting method. Consequently, data for inventories and value added by manufacture are not comparable to prior-year data.

**Table 3a. Summary Statistics for the Industry: 1982**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Petroleum refining (SIC 2911)	Paving mixtures and blocks (SIC 2951)	Asphalt felts and coatings (SIC 2952)	Lubricating oils and greases (SIC 2992)	Petroleum and coal products, n.e.c. (SIC 2999)
Companies <sup>1</sup> ..... number..	283	569	147	401	100
All establishments <sup>2</sup> ..... do..	434	1 034	273	473	109
With 1 to 19 employees ..... do..	121	832	118	320	82
With 20 to 99 employees ..... do..	120	186	106	130	24
With 100 employees or more ..... do..	193	16	49	23	3
All employees:					
Average for year ..... 1,000..	108.7	15.2	14.2	11.9	2.0
Annual payroll <sup>3</sup> ..... mil. dol..	3 410.3	340.5	288.7	266.2	45.5
Production workers:					
Average for year ..... 1,000..	71.3	11.1	10.4	5.6	1.4
March ..... do..	71.8	7.9	9.8	5.6	1.4
May ..... do..	72.2	11.6	10.1	5.7	1.4
August ..... do..	71.4	13.3	11.1	5.7	1.3
November ..... do..	69.8	11.6	10.8	5.5	1.3
Hours ..... millions..	148.4	22.2	21.0	11.3	2.8
January to March ..... do..	36.9	3.2	4.4	2.8	.7
April to June ..... do..	36.6	5.8	5.3	2.9	.7
July to September ..... do..	37.8	7.3	6.0	2.9	.7
October to December ..... do..	37.1	5.8	5.4	2.8	.7
Wages ..... mil. dol..	2 065.1	229.1	195.1	102.3	28.7
Value added by manufacture <sup>4</sup> ..... do..	19 204.3	925.9	816.9	902.6	176.4
Cost of materials, etc. <sup>5</sup> ..... do..	178 947.0	2 162.4	1 993.7	1 949.5	561.1
Materials, parts, containers, etc., consumed ..... do..	166 875.0	1 834.3	1 771.1	1 790.3	452.1
Resales ..... do..	6 337.2	44.2	101.9	94.9	69.0
Fuels consumed <sup>6</sup> ..... do..	3 647.6	166.7	83.0	23.3	27.9
Purchased electric energy <sup>7</sup> ..... do..	1 487.9	48.1	29.9	11.4	8.8
Contract work ..... do..	599.4	69.1	7.8	29.7	3.2
Value of shipments, including resales ..... do..	199 722.8	3 098.6	2 849.5	2 875.3	738.8
Value of resales ..... do..	6 625.3	50.1	137.1	107.8	(D)
Manufacturers' inventories (see tables 3b and 3c)					
Capital expenditures for plant and equipment <sup>8</sup> ..... do..	6 524.8	93.2	61.2	78.2	70.6
New capital expenditures ..... do..	6 412.3	76.1	57.1	67.8	55.6
New buildings and other structures ..... do..	2 428.9	12.3	9.6	14.3	7.0
New machinery and equipment ..... do..	3 983.4	63.8	47.5	53.4	48.6
Used capital expenditures ..... do..	112.6	17.2	4.2	10.5	15.0
Primary product specialization ratio <sup>9</sup> ..... percent..	99	93	95	94	94
Coverage ratio <sup>10</sup> ..... do..	98	96	98	46	89

<sup>1</sup>For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

<sup>2</sup>Includes establishments with payroll at any time during year.

<sup>3</sup>Data on supplemental labor costs are not included in annual payroll, but are shown in table 3d.

<sup>4</sup>Value added by manufacture is computed using inventory data reported on a cost or market basis prior to any adjustment to LIFO cost. See table 3b, footnote 1 for further explanation.

<sup>5</sup>Data on purchased services for the repair of buildings and machinery and for communication services are not included in cost of materials, etc., but are shown in table 3d.

<sup>6</sup>Data on purchased fuels by type were not collected for 1982. See MC82-S-4, Fuels and Electric Energy Consumed, for 1981 data on purchased fuels by type.

<sup>7</sup>Data on quantity of electric energy used for heat and power are included in table 3d.

<sup>8</sup>Data on capital expenditures for new machinery and equipment by type, depreciable assets, retirements, rental payments, and depreciation are included in table 3d.

<sup>9</sup>Represents ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for establishments classified in industry.

<sup>10</sup>Represents ratio of primary products shipped by establishments classified in industry to total shipments of such products by all manufacturing establishments, wherever classified.

**Table 3b. Value of Inventories for the Industry: End of 1981 and 1982**

[Million dollars. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Petroleum refining (SIC 2911)		Paving mixtures and blocks (SIC 2951)		Asphalt felts and coatings (SIC 2952)		Lubricating oils and greases (SIC 2992)		Petroleum and coal products, n.e.c. (SIC 2999)	
	End of 1981	End of 1982	End of 1981	End of 1982	End of 1981	End of 1982	End of 1981	End of 1982	End of 1981	End of 1982
<b>Total inventories<sup>1</sup> .....</b>	<b>17 429.5</b>	<b>16 280.1</b>	<b>182.4</b>	<b>162.1</b>	<b>307.5</b>	<b>256.9</b>	<b>398.5</b>	<b>364.1</b>	<b>196.6</b>	<b>192.4</b>
Detail by method of valuation:										
Subject to LIFO costing <sup>2</sup> .....	10 641.1	9 404.4	54.8	45.8	37.5	33.0	134.1	115.1	(D)	(D)
LIFO reserve .....	7 503.3	5 860.5	32.9	26.4	10.2	8.8	55.3	44.6	(D)	(D)
LIFO value .....	3 137.8	3 543.9	21.9	19.4	27.3	24.2	78.8	70.5	(D)	(D)
Not subject to LIFO costing .....	5 937.1	5 956.8	55.3	62.2	248.5	200.3	157.1	143.6	110.2	116.0
Valuation method not reported <sup>3</sup> .....	678.0	756.9	70.8	52.6	21.3	23.2	96.1	89.3	(D)	(D)
Amount subject to LIFO reported without associated reserve and value <sup>4</sup> .....	173.3	162.0	1.4	1.4	.3	.3	11.3	16.0	(D)	(D)
Detail by stage of fabrication:										
Finished goods .....	8 632.5	7 493.8	69.6	71.6	163.7	125.6	210.4	188.4	35.1	30.8
Work in process .....	4 183.5	3 750.9	27.5	15.1	10.8	10.1	23.5	22.3	4.5	7.5
Materials and supplies .....	4 613.5	5 035.5	85.3	75.3	133.0	121.1	164.6	153.3	157.0	154.1

<sup>1</sup>Effective with the 1982 Economic Censuses, uniform instructions for reporting inventories were introduced for all sector reports. Prior to 1982, respondents were permitted to value inventories using any generally accepted accounting method (LIFO, FIFO, market, to name a few). In 1982, all respondents were requested to report inventories at cost or market. LIFO users were asked to first report inventory values prior to the LIFO adjustment and then to report the LIFO reserve and the LIFO value after adjustment for the reserve. For further explanation, see inventories in appendixes.

<sup>2</sup>Only includes data reported by respondents who (a) indicated amount of inventories subject to LIFO cost, and (b) provided sufficient information to determine associated LIFO reserve and value figures.

<sup>3</sup>Includes data estimated for nonresponse and nonmail administrative records and data reported by respondents who provided total inventory figures without other information.

<sup>4</sup>Includes data reported by respondents who indicated their inventories were subject to LIFO cost, but did not provide associated LIFO reserve and value figures.

**Table 3c. Inventories by Specific Method of Valuation for the Industry: End of 1982**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Petroleum refining (SIC 2911)		Paving mixtures and blocks (SIC 2951)		Asphalt felts and coatings (SIC 2952)		Lubricating oils and greases (SIC 2992)		Petroleum and coal products, n.e.c. (SIC 2999)	
	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)	Percent of total	Absolute standard error (percent)
<b>Total inventories</b> .....	100.0	(X)	100.0	(X)	100.0	(X)	100.0	(X)	100.0	(X)
Last-in, First-Out (LIFO) methods .....	57.8	(X)	28.3	(X)	12.8	(X)	31.6	(X)	(D)	(X)
Non-LIFO methods .....	36.6	(X)	38.4	(X)	78.0	(X)	39.4	(X)	60.3	(X)
Cost basis:										
First-in, First-Out (FIFO) .....	5.0	.1	21.5	1.2	16.8	4.2	10.7	2.4	3.9	.3
Average cost .....	23.0	.1	7.8	.8	5.0	1.3	8.9	1.9	25.1	2.1
Specific or actual cost .....	2.7	.1	11.6	1.1	2.4	1.0	16.5	3.5	6.0	.4
Standard cost .....	3.7	.1	1.2	.1	47.8	5.7	3.3	.7	16.7	1.3
Other .....	1.5	(Z)	(S)	(S)	(S)	(S)	.1	(Z)	1.7	.1
Market basis:										
Market lower than cost .....	.3	.1	.6	.1	(S)	(S)	(Z)	(Z)	(S)	(S)
Market always used .....	.4	(Z)	(S)	(S)	(Z)	(Z)	(Z)	(Z)	(Z)	(Z)
Valuation method not reported .....	4.6	(X)	32.5	(X)	9.0	(X)	24.5	(X)	(D)	(X)
Amount subject to LIFO reported without associated reserve and value .....	1.0	(X)	.9	(X)	.1	(X)	4.4	(X)	(D)	(X)

Note: The percentages shown for the LIFO and non-LIFO totals and the categories "valuation method not reported" and "amount subject to LIFO reported..." are based on the census universe estimates included in table 3b. The percentages shown for the specific non-LIFO methods of valuation (e.g., FIFO, etc.) are based on a representative sample of establishments included in the annual survey of manufactures (ASM) panel for 1982 (see appendixes for description of ASM). The absolute standard error of each of the ASM estimates is shown above.

**Table 3d. Supplemental Industry Statistics Based on Sample Estimates: 1982**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Item	Petroleum refining (SIC 2911)		Paving mixtures and blocks (SIC 2951)		Asphalt felts and coatings (SIC 2952)		Lubricating oils and greases (SIC 2992)		Petroleum and coal products, n.e.c. (SIC 2999)	
	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)	Amount (million dollars)	Relative standard error of estimate <sup>1</sup> (percent)
<b>Supplemental labor costs:</b>										
Total .....	922.3	1	64.8	4	69.9	3	50.8	10	12.0	2
Legal costs .....	250.2	1	33.8	5	32.2	4	19.3	10	4.1	2
Voluntary costs .....	672.1	1	31.0	4	37.6	4	31.5	11	7.9	2
<b>Purchased services:</b>										
Cost of purchased services for the repair of—										
Buildings and other structures .....	341.1	1	2.0	18	3.3	28	2.1	14	.7	27
Response coverage ratio (percent) <sup>2</sup> .....	79.3	(X)	57.0	(X)	58.1	(X)	67.0	(X)	69.4	(X)
Machinery .....	823.4	1	25.0	27	12.9	17	7.3	17	10.9	16
Response coverage ratio (percent) <sup>2</sup> .....	77.0	(X)	62.3	(X)	68.9	(X)	76.5	(X)	77.8	(X)
Cost of purchased communication services .....	38.6	2	2.9	6	3.8	15	4.3	20	.4	9
Response coverage ratio (percent) <sup>2</sup> .....	88.7	(X)	63.5	(X)	71.5	(X)	77.1	(X)	77.8	(X)
<b>Electric energy used for heat and power:</b>										
Purchased:										
Quantity (million kWh) .....	32 367.0	1	975.2	18	551.4	3	173.3	3	174.1	2
Cost .....	1 487.9	(X)	48.1	(X)	29.9	(X)	11.4	(X)	8.8	(X)
Generated less sold (million kWh) .....	(S)	(S)	(D)	(S)	(D)	(S)	(S)	(S)	(Z)	1
<b>Gross book value of depreciable assets:</b>										
Total:										
Beginning of year .....	40 822.0	1	1 037.0	3	776.4	5	416.6	8	322.2	9
New capital expenditures .....	6 164.0	1	57.6	28	49.6	16	59.9	12	54.0	4
Used capital expenditures .....	37.1	5	7.7	16	4.6	11	8.4	43	(S)	(S)
Retirements .....	1 158.3	2	31.8	10	75.7	29	10.0	20	3.5	17
End of year .....	45 864.9	1	1 070.6	4	755.0	5	474.9	7	372.8	8
<b>Buildings and other structures:</b>										
Beginning of year .....	14 475.1	1	137.0	4	196.4	5	117.9	6	30.7	6
New capital expenditures .....	2 379.7	1	6.1	19	7.7	20	12.1	11	6.4	2
Used capital expenditures .....	22.8	1	.7	11	1.2	1	4.4	60	(S)	(S)
Retirements .....	279.0	3	8.1	8	13.2	32	3.5	27	2	28
End of year .....	16 598.6	1	135.7	4	192.0	5	130.9	4	36.8	5
<b>Machinery and equipment:</b>										
Beginning of year .....	26 346.9	1	900.0	3	580.0	6	298.7	11	291.6	10
New capital expenditures .....	3 784.4	1	51.5	31	42.0	16	47.8	13	47.6	4
Automobiles, trucks, etc., for highway use .....	16.5	7	4.2	14	.9	26	2.3	27	.1	19
Computers and peripheral data processing equipment .....	13.1	7	.2	18	.3	58	1.9	81	(Z)	61
All other .....	3 346.0	1	38.5	41	33.4	18	26.2	19	17.4	10
New machinery and equipment, n.s.k. <sup>3</sup> .....	408.7	3	8.7	9	7.3	33	17.4	9	30.1	1
Used capital expenditures .....	14.3	12	7.0	16	3.5	15	4.0	49	(S)	(S)
Retirements .....	879.2	3	23.7	13	62.5	29	6.5	24	3.3	18
End of year .....	29 266.3	1	934.9	5	563.0	5	344.1	9	336.0	9
<b>Rental payments:</b>										
Total .....	132.0	4	19.3	15	11.4	17	9.5	18	2.0	4
Buildings and other structures .....	23.7	2	1.2	5	3.6	21	5.9	25	.7	5
Machinery and equipment .....	108.3	5	18.1	16	7.7	21	3.6	21	1.2	4
<b>Depreciation charges during 1982:</b>										
Total .....	1 846.1	1	76.7	4	52.8	6	32.6	10	18.8	11
Buildings and other structures .....	567.5	1	7.7	5	8.7	6	5.9	15	1.4	8
Machinery and equipment .....	1 278.6	1	69.0	4	44.0	6	26.7	11	17.4	11

See footnotes at end of table.

Table 3d. Supplemental Industry Statistics Based on Sample Estimates: 1982—Con.

Note: Data for total new capital expenditures, new building expenditures, new machinery expenditures, and total used expenditures are also shown in table 3a. Data in table 3a are census universe totals and may differ from annual survey of manufactures (ASM) sample estimates shown in this table. Data in this table represent best estimates of year-to-year change as measured by the continuing ASM sample. However, they are subject to sampling error and, hence, as estimates of level, are not as reliable as universe figures shown in table 3a.

<sup>1</sup>For description of relative standard error of estimate, see Qualifications of the Data in appendixes.

<sup>2</sup>Measure of extent to which respondents reported each item. Derived for each item by calculating the ratio of weighted employment for those sample establishments that reported the specific inquiry to weighted total employment for all sample establishments classified in industry. (See appendixes for explanation of sample weight.)

<sup>3</sup>Represents total machinery and equipment expenditures for establishments that did not break down their expenditures by specific type.

Table 4. Industry Statistics by Employment Size of Establishment: 1982

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and employment size class	E <sup>1</sup>	All estab- lish- ments (no.)	All employees		Production workers			Value added by manufac- ture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expend- itures (million dollars)	End-of- year invent- ories (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)					
INDUSTRY 2911, PETROLEUM REFINING												
Total.....	-	434	108.7	3 410.3	71.3	148.4	2 065.1	19 204.3	178 947.0	199 722.8	6 412.3	16 280.1
Establishments with an average of—												
1 to 4 employees.....	E6	42	.1	1.8	.1	.1	1.2	6.1	59.3	80.2	14.6	8.9
5 to 9 employees.....	E6	37	.3	5.3	.2	.3	3.1	5.1	139.3	149.7	(D)	8.3
10 to 19 employees.....	E4	42	.6	11.5	.4	.8	7.2	63.9	567.8	627.4	8.1	40.9
20 to 49 employees.....	E1	75	2.4	58.1	1.6	3.6	37.5	705.7	2 933.6	3 691.2	78.5	299.0
50 to 99 employees.....	E3	45	3.2	83.7	2.2	4.3	52.3	840.5	3 907.5	4 731.3	84.6	355.4
100 to 249 employees.....	-	73	12.3	361.5	8.6	18.2	236.2	1 918.2	22 099.2	24 264.8	1 057.9	1 864.1
250 to 499 employees.....	-	55	19.0	583.7	12.0	25.6	360.2	3 450.6	35 181.7	38 916.4	974.5	3 219.5
500 to 999 employees.....	-	41	27.7	905.0	18.1	40.0	560.1	7 023.5	49 890.2	57 042.4	2 116.0	4 569.4
1,000 to 2,499 employees.....	-	22	43.2	1 399.8	28.2	55.4	807.2	5 190.7	64 168.5	70 219.3	2 078.1	5 914.7
2,500 employees or more.....	-	2	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
INDUSTRY 2951, PAVING MIXTURES AND BLOCKS												
Total.....	E1	1 034	15.2	340.5	11.1	22.2	229.1	925.9	2 162.4	3 098.6	76.1	162.1
Establishments with an average of—												
1 to 4 employees.....	E2	405	1.1	24.5	.8	1.7	18.6	118.7	326.3	445.8	6.6	17.6
5 to 9 employees.....	E1	280	1.8	40.2	1.3	2.6	27.9	182.5	531.6	717.7	16.7	33.7
10 to 19 employees.....	E2	147	2.0	42.0	1.5	2.9	28.1	129.4	309.0	440.8	16.4	24.3
20 to 49 employees.....	E2	138	4.2	94.4	2.9	6.0	60.5	213.2	483.5	702.1	15.7	42.4
50 to 99 employees.....	E1	48	3.2	67.8	2.3	4.9	46.9	130.2	301.2	429.7	10.0	23.0
100 to 249 employees.....	E4	12	1.7	38.1	1.3	2.7	24.0	84.9	110.9	195.7	4.9	12.3
250 to 499 employees.....	-	3	1.3	33.4	1.0	1.5	23.0	66.8	99.8	166.9	5.7	8.8
500 to 999 employees.....	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records <sup>2</sup> .....	E9	31	.1	1.8	.1	.2	1.3	5.4	12.8	18.3	.4	.9
INDUSTRY 2952, ASPHALT FELTS AND COATINGS												
Total.....	-	273	14.2	288.7	10.4	21.0	195.1	816.9	1 993.7	2 849.5	57.1	256.9
Establishments with an average of—												
1 to 4 employees.....	E7	47	.1	1.7	.1	.1	1.3	5.0	11.9	16.9	.3	2.3
5 to 9 employees.....	E2	28	.2	4.0	.1	.3	2.6	10.9	28.2	39.7	.9	3.6
10 to 19 employees.....	E1	43	.6	11.4	.4	.8	7.2	36.5	169.3	207.2	2.3	23.6
20 to 49 employees.....	-	52	1.6	30.3	1.1	2.3	18.1	94.5	327.1	424.9	7.6	36.2
50 to 99 employees.....	-	54	3.9	77.0	2.8	5.7	49.9	261.2	505.9	778.0	19.1	68.5
100 to 249 employees.....	-	46	6.8	140.5	5.1	10.3	99.4	373.4	839.4	1 232.7	22.0	107.9
250 to 499 employees.....	-	3	1.0	23.9	.7	1.5	16.5	35.5	111.9	150.1	5.0	14.6
Covered by administrative records <sup>2</sup> .....	E9	19	.1	.9	(Z)	.1	.7	2.2	6.4	8.7	.2	1.0
INDUSTRY 2992, LUBRICATING OILS AND GREASES												
Total.....	E1	473	11.9	266.2	5.6	11.3	102.3	902.6	1 949.5	2 875.3	67.8	364.1
Establishments with an average of—												
1 to 4 employees.....	E8	149	.3	4.9	.2	.3	2.5	28.4	78.3	107.6	1.3	10.4
5 to 9 employees.....	E5	79	.5	10.2	.3	.6	4.7	33.4	83.1	116.1	1.5	16.7
10 to 19 employees.....	E1	92	1.3	27.3	.7	1.4	11.5	109.4	211.4	330.7	7.5	38.6
20 to 49 employees.....	E1	87	2.8	62.6	1.4	2.9	26.1	260.6	614.5	872.6	11.9	115.0
50 to 99 employees.....	E1	43	3.1	71.7	1.7	3.6	34.3	243.9	564.2	817.0	22.3	105.5
100 to 249 employees.....	E2	20	2.7	62.7	1.1	2.3	21.2	181.1	370.8	557.3	21.5	68.3
250 to 499 employees.....	-	2	1.2	26.8	.1	.3	2.0	45.8	27.3	73.9	1.6	9.7
500 to 999 employees.....	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records <sup>2</sup> .....	E9	39	.1	1.8	.1	.1	.9	5.2	14.5	19.9	.3	2.4
INDUSTRY 2999, PETROLEUM AND COAL PRODUCTS, N.E.C.												
Total.....	-	109	2.0	45.5	1.4	2.8	28.7	176.4	561.1	738.8	55.6	192.4
Establishments with an average of—												
1 to 4 employees.....	E8	48	.1	1.1	(Z)	.1	.8	3.8	10.4	14.9	40.2	3.0
5 to 9 employees.....	E8	16	.1	2.2	.1	.1	1.3	11.4	9.6	18.1	(D)	5.4
10 to 19 employees.....	E1	18	.3	5.2	.2	.4	3.3	25.2	66.4	90.9	(D)	15.5
20 to 49 employees.....	E1	16	.5	10.1	.3	.7	6.2	41.5	93.2	134.6	(D)	50.0
50 to 99 employees.....	-	8	1.0	26.9	.8	1.5	17.1	94.4	381.5	480.2	15.4	118.5
100 to 249 employees.....	-	2	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
250 to 499 employees.....	-	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
Covered by administrative records <sup>2</sup> .....	E9	27	(Z)	.9	(Z)	.1	.7	1.7	5.4	7.1	.1	1.6

Note: For qualifications of data, see footnotes on table 1e. Data shown as a (D) are included in underscored figures above.

<sup>1</sup>Payroll and sales data for some small single-unit companies with up to 20 employees (cutoff varied by industry) were obtained from administrative records of other government agencies rather than from census report forms. These data were then used in conjunction with industry averages to estimate the items shown for these small establishments. This technique was also used for a small number of other establishments whose reports were not received at time data were tabulated. The following symbols are shown for those States where estimated data based on administrative records data account for 10 percent or more of figures shown: E1—10 to 19 percent; E2—20 to 29 percent; E3—30 to 39 percent; E4—40 to 49 percent; E5—50 to 59 percent; E6—60 to 69 percent; E7—70 to 79 percent; E8—80 to 89 percent; E9—90 percent or more.

<sup>2</sup>Report forms were not mailed to small single-unit companies with up to 20 employees (cutoff varied by industry). Payroll and sales data for 1982 were obtained from administrative records supplied by other agencies of the Federal Government. Those data were then used in conjunction with industry averages to estimate the items shown. Data are also included in respective size classes shown.

**Table 5a. Industry Statistics by Industry and Primary Product Class Specialization: 1982**

[Table presents selected statistics for establishments according to their degree of specialization in products primary to their industry. Measures of plant specialization shown are (1) industry specialization: ratio of primary product shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment; and (2) product class specialization: ratio of largest primary product class shipments to total product shipments (primary plus secondary, excluding miscellaneous receipts) for the establishment. See appendix for method of computing ratios. Statistics for establishments with specialization ratios of less than 75 percent are included in total lines but are not shown as a separate class. In addition, data may not be shown for various reasons; e.g., to avoid disclosing data for individual companies. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes.]

Industry or product class code	Industry or product class by percent of specialization	All establishments (number)	All employees		Production workers			Value added by manufacture (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expenditures (million dollars)
			Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)				
<b>2911</b>	<b>Petroleum refining:</b>										
	Entire industry .....	434	108.7	3 410.3	71.3	148.4	2 065.1	19 204.3	178 947.0	199 722.8	6 412.3
	Establishments with 75 percent specialization or more ..	408	102.9	3 228.5	68.0	142.0	1 972.8	18 906.3	176 214.0	196 646.4	6 313.8
<b>29111</b>	<b>Gasoline, including finished base stocks and blending agents:</b>										
	Establishments with this product class primary .....	163	84.9	2 735.2	56.3	116.7	1 663.3	16 033.0	156 985.9	174 300.0	4 925.0
	Establishments with 75 percent specialization or more in class .....	12	3.0	99.2	2.1	4.3	65.3	942.9	6 415.1	7 383.5	192.6
<b>29112</b>	<b>Jet fuel:</b>										
	Establishments with this product class primary .....	16	1.5	43.0	.7	1.6	19.4	585.6	3 273.4	3 851.5	63.2
	Establishments with 75 percent specialization or more in class .....	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
<b>29114</b>	<b>Light fuel oils:</b>										
	Establishments with this product class primary .....	25	3.1	80.6	1.9	4.2	52.4	482.0	4 339.2	4 881.0	273.7
	Establishments with 75 percent specialization or more in class .....	4	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
<b>29115</b>	<b>Heavy fuel oil:</b>										
	Establishments with this product class primary .....	26	1.6	35.9	1.2	2.5	22.7	268.0	1 697.5	1 978.6	23.2
	Establishments with 75 percent specialization or more in class .....	7	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
<b>29117</b>	<b>Lubricating oils and greases made in refineries:</b>										
	Establishments with this product class primary .....	12	1.7	39.1	1.2	2.2	29.8	218.9	939.8	1 162.6	29.1
	Establishments with 75 percent specialization or more in class .....	6	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
<b>29118</b>	<b>Unfinished oils and lubricating oil base stock:</b>										
	Establishments with this product class primary .....	19	3.1	97.5	2.2	4.1	59.5	332.5	2 826.6	3 214.3	139.3
	Establishments with 75 percent specialization or more in class .....	6	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
<b>29119</b>	<b>Asphalt:</b>										
	Establishments with this product class primary .....	23	.7	19.7	.5	.9	12.0	100.5	454.7	552.0	10.9
	Establishments with 75 percent specialization or more in class .....	15	.3	7.1	.2	.4	4.8	38.1	167.2	196.6	6.5
<b>2911A</b>	<b>Liquefied refinery gases, including other aliphatics, made in a refinery:</b>										
	Establishments with this product class primary .....	3	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
	Establishments with 75 percent specialization or more in class .....	2	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
<b>2911B</b>	<b>Liquefied refinery gases, including other aliphatics, not made in a refinery:</b>										
	Establishments with this product class primary .....	21	7.9	256.7	4.6	10.2	141.2	710.8	5 214.8	6 082.6	287.5
	Establishments with 75 percent specialization or more in class .....	9	1.5	47.6	.9	2.6	27.5	598.7	1 560.6	2 205.6	88.7
<b>2911C</b>	<b>Aromatics made from purchased refinery products:</b>										
	Establishments with this product class primary .....	2	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
	Establishments with 75 percent specialization or more in class .....	1	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
<b>2911D</b>	<b>Other finished petroleum products (including waxes):</b>										
	Establishments with this product class primary .....	26	1.3	30.5	.9	1.9	18.7	44.8	485.2	555.3	12.9
	Establishments with 75 percent specialization or more in class .....	16	.6	12.1	.4	.7	7.0	28.5	98.1	129.1	2.6
<b>2951</b>	<b>Paving mixtures and blocks:</b>										
	Entire industry .....	1 034	15.2	340.5	11.1	22.2	229.1	925.9	2 162.4	3 098.6	76.1
	Establishments with 75 percent specialization or more ..	921	11.0	248.1	8.0	16.0	167.2	695.5	1 860.7	2 568.0	65.1
<b>2952</b>	<b>Asphalt felts and coatings:</b>										
	Entire industry .....	273	14.2	288.7	10.4	21.0	195.1	816.9	1 993.7	2 849.5	57.1
	Establishments with 75 percent specialization or more ..	256	13.5	273.2	10.0	20.2	187.6	742.9	1 900.7	2 682.6	55.2
<b>29521</b>	<b>Asphalt and tar saturated felts and boards for nonbuilding use:</b>										
	Establishments with this product class primary .....	14	.6	10.8	.4	.8	7.1	18.8	44.9	67.1	1.5
	Establishments with 75 percent specialization or more in class .....	10	.4	7.7	.3	.5	5.4	12.8	33.3	49.5	1.2
<b>29522</b>	<b>Roofing asphalts and pitches, coatings, and cements:</b>										
	Establishments with this product class primary .....	76	1.8	37.8	1.0	2.1	16.2	141.9	246.5	389.5	5.2
	Establishments with 75 percent specialization or more in class .....	57	1.2	25.0	.7	1.5	10.5	101.8	166.4	269.7	3.5
<b>29523</b>	<b>Prepared asphalt and tar roofing and siding products:</b>										
	Establishments with this product class primary .....	121	11.1	228.8	8.5	17.0	163.5	635.5	1 648.4	2 317.7	48.4
	Establishments with 75 percent specialization or more in class .....	104	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)	(D)
<b>2992</b>	<b>Lubricating oils and greases:</b>										
	Entire industry .....	473	11.9	266.2	5.6	11.3	102.3	902.6	1 949.5	2 875.3	67.8
	Establishments with 75 percent specialization or more ..	430	10.2	228.4	4.9	9.9	90.1	785.0	1 767.9	2 575.1	61.2
<b>2999</b>	<b>Petroleum and coal products, n.e.c.:</b>										
	Entire industry .....	109	2.0	45.5	1.4	2.8	28.7	176.4	561.1	738.8	55.6
	Establishments with 75 percent specialization or more ..	99	1.6	35.8	1.1	2.2	22.9	160.2	535.1	696.7	18.7

Note: For qualifications of data, see footnotes on table 1a.

**Table 5b. Industry-Product Analysis—Value of Shipments and Primary Product Shipments, Specialization and Coverage Ratios for the Industry: 1982 and Earlier Census Years**

[An establishment is assigned to an industry based on shipment values of products representing largest amount considered primary to an industry. Frequently, establishment shipments comprise mixtures of products assigned to an industry (primary), those considered primary to other industries (secondary), and receipts for activities such as merchandising or contract work. Columns A-D show this product pattern for an industry, and column E shows primary product specialization ratio. The extent to which an industry's primary products are shipped by establishments classified in and out of an industry is shown in columns F-H and coverage ratio is shown in column I. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Industry and product group code	Industry and census year	Value of shipments					Value of primary product shipments			
		Total (million dollars)	Primary products (million dollars)	Secondary products (million dollars)	Miscellaneous receipts (million dollars)	Primary product specialization ratio Col. B ÷ Col. B+C (percent)	Total made in all industries (million dollars)	Made in this industry (million dollars)	Made in other industries (million dollars)	Coverage ratio Col. B ÷ Col. F (percent)
		A	B	C	D	E	F	G	H	I
2911	Petroleum refining ----- 1982--	199 722.8	189 998.7	2 704.1	7 020.0	99	194 093.0	189 998.7	14 094.3	98
	1977--	91 688.8	87 204.8	790.5	3 693.5	99	190 103.9	87 204.8	12 899.1	97
	1972--	125 921.1	24 590.1	322.3	1 008.7	99	125 414.8	24 590.1	1824.7	97
2951	Paving mixtures and blocks ----- 1982--	3 098.6	2 757.1	216.3	125.2	93	2 881.0	2 757.1	123.8	96
	1977--	1 578.3	1 409.1	80.8	88.4	95	1 518.6	1 409.1	109.5	93
	1972--	922.6	806.8	64.0	51.8	93	893.4	806.8	86.6	90
2952	Asphalt felts and coatings ----- 1982--	2 849.5	2 580.5	126.7	142.3	95	2 633.2	2 580.5	52.7	98
	1977--	2 077.6	1 765.2	184.5	127.9	91	1 828.6	1 765.2	63.4	97
	1972--	1 011.4	869.5	67.8	74.1	93	902.2	869.5	32.7	96
2992	Lubricating oils and greases ----- 1982--	2 875.3	2 574.9	156.6	143.8	94	25 609.7	2 574.9	23 034.8	46
	1977--	1 644.7	1 425.5	88.1	131.1	94	23 232.8	1 425.5	21 807.3	44
	1972--	703.1	612.6	36.2	54.2	94	21 536.8	612.6	2924.1	40
2999	Petroleum and coal products, n.e.c. ----- 1982--	738.8	623.4	39.0	76.4	94	700.3	623.4	76.9	89
	1977--	463.3	429.6	13.6	20.1	97	494.6	429.6	65.0	87
	1972--	137.6	126.3	1.5	9.8	99	139.2	126.3	12.9	91

<sup>1</sup>Figure includes lubricating oils and greases not made in petroleum refineries (primary products of industry 2992).

<sup>2</sup>Figure includes lubricating oils and greases made in petroleum refineries (primary products of industry 2911).

**Table 5c-1. Industry-Product Analysis—Shipments by Product Class and Industry: 1982**

[Million dollars. Table shows where products of an industry (referred to as primary and listed in table 6a) are made and what products are made by establishments classified in an industry. Read down an industry column to find what products are produced in an industry. Only those product groups that have at least \$2 million in shipments from establishments classified in one of industries included in this chapter are shown. Read across to determine where products of industries in this chapter are produced. To extent that some of primary products are made in industries not included in this chapter, value of such shipments is shown in "Other industries" column. Specified "Other industries" are listed in table 5c-2 if they account for more than \$5 million of products primary to this chapter. For meaning of abbreviations and symbols, see explanatory text. For explanation of terms, see appendixes]

1982 product code	Product group, product class, and miscellaneous receipts	All industries	Petroleum refining (SIC 2911)	Paving mixtures and blocks (SIC 2951)	Asphalt felts and coatings (SIC 2952)	Lubricating oils and greases (SIC 2992)	Petroleum and coal products, n.e.c. (SIC 2999)	Other industries
	<b>Total</b> -----	(X)	199 722.8	3 098.6	2 849.5	2 875.3	738.8	(X)
	<b>Primary products</b> -----	(X)	189 998.7	2 757.1	2 580.5	2 574.9	623.4	(X)
	<b>Secondary products</b> -----	(X)	2 704.1	216.3	126.7	156.6	39.0	(X)
	<b>Miscellaneous receipts</b> -----	(X)	7 020.0	125.2	142.3	143.8	76.4	(X)
2911-	<b>Petroleum refining</b> -----	191 374.7	189 998.7	6.0	-	(D)	(D)	1 287.0
29111	Gasoline, including finished base stocks and blending agents -----	95 114.7	(D)	-	-	(D)	-	-
29112	Jet fuel -----	14 862.4	(D)	-	-	(D)	-	(D)
29113	Kerosene -----	1 886.6	(D)	-	-	(D)	-	-
29114	Light fuel oils -----	37 302.6	37 297.9	-	-	(D)	-	(D)
29115	Heavy fuel oil -----	11 390.6	11 375.1	-	-	(D)	-	(D)
29117	Lubricating oils and greases made in refineries -----	2 891.4	2 891.4	-	-	-	-	-
29118	Unfinished oils and lubricating oil base stock -----	8 065.9	7 999.2	-	-	(D)	-	(D)
29119	Asphalt -----	2 980.3	2 978.4	-	-	(D)	-	(D)
2911A	Liquefied refinery gases, including other aliphatics, made in a refinery -----	4 454.7	(D)	-	-	(D)	-	(D)
2911B	Liquefied refinery gases, including other aliphatics, not made in a refinery -----	3 941.4	3 608.7	-	-	-	-	332.7
2911C	Aromatics made from purchased refinery products -----	1 353.7	489.5	-	-	-	-	864.3
2911D	Other finished petroleum products (including waxes) -----	5 609.3	5 571.3	(D)	-	16.6	(D)	(D)
29110	Petroleum refining products, n.s.k. -----	1 521.2	1 502.6	(D)	-	(D)	-	(D)
29510	<b>Paving mixtures and blocks</b> -----	2 881.0	(D)	2 757.1	(D)	(D)	-	79.1
2952-	<b>Asphalt felts and coatings</b> -----	2 633.2	(D)	8.6	2 580.5	(D)	-	(D)
29521	Asphalt and tar saturated felts and boards for nonbuilding use -----	64.4	-	(D)	62.7	-	-	(D)
29522	Roofing asphalts and pitches, coatings, and cements -----	466.8	(D)	(D)	436.6	(D)	-	5.7
29523	Prepared asphalt and tar roofing and siding products -----	2 030.8	(D)	(D)	2 015.6	-	-	(D)
29520	Asphalt felts and coatings, n.s.k. -----	71.2	-	-	65.7	-	-	5.5
29920	<b>Lubricating oils and greases not made in a refinery</b> -----	2 718.3	(D)	-	(D)	2 574.9	2.4	127.2
29990	<b>Petroleum and coal products, n.e.c.</b> -----	700.3	47.6	-	-	(D)	623.4	(D)

See footnotes at end of table.

Table 5c-1. Industry-Product Analysis—Shipments by Product Class and Industry: 1982—Con.

[Million dollars. Table shows where products of an industry (referred to as primary and listed in table 6a) are made and what products are made by establishments classified in an industry. Read down an industry column to find what products are produced in an industry. Only those product groups that have at least \$2 million in shipments from establishments classified in one of industries included in this chapter are shown. Read across to determine where products of industries in this chapter are produced. To extent that some of primary products are made in industries not included in this chapter, value of such shipments is shown in "Other industries" column. Specified "Other industries" are listed in table 5c-2 if they account for more than \$5 million of products primary to this chapter. For meaning of abbreviations and symbols, see explanatory text. For explanation of terms, see appendixes]

1982 product code	Product group, product class, and miscellaneous receipts	All industries	Petroleum refining (SIC 2911)	Paving mixtures and blocks (SIC 2951)	Asphalt felts and coatings (SIC 2952)	Lubricating oils and greases (SIC 2992)	Petroleum and coal products, n.e.c. (SIC 2999)	Other industries
<b>OTHER SHIPMENTS BY FOUR-DIGIT PRODUCT GROUP</b>								
1422-	Crushed and broken limestone .....	(X)	-	31.8	-	-	-	(X)
1423-	Crushed and broken granite .....	(X)	-	3.3	-	-	-	(X)
1429-	Crushed and broken stone, n.e.c. ....	(X)	-	62.2	(D)	-	-	(X)
1442-	Construction sand and gravel .....	(X)	-	41.3	-	-	-	(X)
1499-	Miscellaneous nonmetallic minerals, n.e.c. ....	(X)	-	(D)	-	-	-	(X)
2661-	Building paper and board .....	(X)	-	-	15.8	-	-	(X)
2812-	Alkalies and chlorine .....	(X)	(D)	-	-	-	-	(X)
2813-	Industrial gases .....	(X)	20.3	-	-	-	-	(X)
2819-	Industrial inorganic chemicals, n.e.c. ....	(X)	240.1	-	(D)	(D)	(D)	(X)
2821-	Plastics materials and resins .....	(X)	(D)	-	(D)	(D)	-	(X)
2822-	Synthetic rubber .....	(X)	(D)	-	-	-	-	(X)
2842-	Polishes and sanitation goods .....	(X)	-	-	(D)	8.2	-	(X)
2843-	Surface active agents .....	(X)	79.5	-	-	4.8	-	(X)
2851-	Paints and allied products .....	(X)	(D)	(D)	4.2	1.3	-	(X)
2865-	Cyclic crudes and intermediates .....	(X)	415.0	-	(D)	-	-	(X)
2869-	Industrial organic chemicals, n.e.c. ....	(X)	1 136.1	-	-	13.1	-	(X)
2873-	Nitrogenous fertilizers .....	(X)	(D)	-	-	-	-	(X)
2874-	Phosphatic fertilizers .....	(X)	(D)	-	-	-	-	(X)
2879-	Agricultural chemicals, n.e.c. ....	(X)	(D)	-	-	1.3	-	(X)
2891-	Adhesives and sealants .....	(X)	-	(D)	15.6	2.9	-	(X)
2895-	Carbon black .....	(X)	19.9	-	-	-	-	(X)
2899-	Chemical preparations, n.e.c. ....	(X)	4.4	(D)	-	26.9	2.0	(X)
3079-	Miscellaneous plastics products .....	(X)	-	-	(D)	-	-	(X)
3272-	Concrete products, n.e.c. ....	(X)	-	(D)	-	-	-	(X)
3273-	Ready-mixed concrete .....	(X)	-	36.7	-	-	-	(X)
3292-	Asbestos products .....	(X)	-	-	(D)	-	-	(X)
3599-	Machinery, except electrical, n.e.c. ....	(X)	-	-	-	(D)	-	(X)
<b>MISCELLANEOUS RECEIPTS</b>								
93000 00	Receipts for work done for others on their materials .....	(X)	261.8	12.0	(D)	32.6	(D)	(X)
99980 13	Sales of scrap and refuse .....	(X)	6.6	(Z)	1.7	.1	(D)	(X)
99980 41	Receipts for research and development work .....	(X)	(D)	-	-	-	(D)	(X)
99980 98	Other miscellaneous receipts, including receipts for repair work, etc. ....	(X)	91.7	61.8	(D)	3.3	-	(X)
99980 00	Other miscellaneous receipts, n.s.k. ....	(X)	(D)	1.2	(D)	(Z)	-	(X)
99989 00	Sales of products bought and resold without further manufacture, processing, or assembly at establishment .....	(X)	6 625.3	50.1	137.1	107.8	(D)	(X)

Table 5c-2. Industry-Product Analysis—Other Industries With Shipments of Primary Products: 1982

[Million dollars. Table is a continuation of table 5c-1 and shows where products of industries in this chapter (referred to as primary products and listed in table 6a) are made. To extent that some of primary products are made in industries not included in this chapter, value of such shipments is shown in "Other industries" column of table 5c-1. Specified "Other industries" are listed in this table if they account for more than \$5 million of products primary to this chapter. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

1982 product code	Other industries	Value	1982 product code	Other industries	Value
2911-	<b>PETROLEUM REFINING</b>		2992-	<b>LUBRICATING OILS AND GREASES</b>	
	2821 Plastics materials and resins .....	134.1		2821 Plastics materials and resins .....	(D)
	2843 Surface active agents .....	(D)		2841 Soap and other detergents .....	27.4
	2865 Cyclic crudes and intermediates .....	(D)		2842 Polishes and sanitation goods .....	7.3
	2869 Industrial organic chemicals, n.e.c. ....	858.3		2869 Industrial organic chemicals, n.e.c. ....	36.5
2951-	<b>PAVING MIXTURES AND BLOCKS</b>			2899 Chemical preparations, n.e.c. ....	24.7
	1422 Crushed and broken limestone .....	24.4		3519 Internal combustion engines, n.e.c. ....	(D)
	3241 Cement, hydraulic .....	(D)			
	3273 Ready-mixed concrete .....	26.7	2999-	<b>PETROLEUM AND COAL PRODUCTS, N.E.C.</b>	
2952-	<b>ASPHALT FELTS AND COATINGS</b>			3334 Primary aluminum .....	(D)
	2891 Adhesives and sealants .....	6.0			

**Table 6a-1. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1982 and 1977**

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 product code	Product	1982				1977			
		Number of companies with shipments of \$100,000 or more	Receipts <sup>2</sup> (quantity)	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Receipts <sup>2</sup> (quantity)	Product shipments	
				Quantity <sup>3</sup>	Value (million dollars)			Quantity	Value (million dollars)
PETROLEUM PRODUCTS									
2911- — 2992- — 2992- —	Total -----	(NA)	(X)	(X)	194 093.0	(NA)	(X)	(X)	90 103.9
2911- — 2992- —	Products of petroleum refining -----	(NA)	(X)	(X)	191 374.7	(NA)	(X)	(X)	88 589.5
2992- —	Lubricating oils and greases, not made in refineries -----	(NA)	(X)	(X)	2 718.3	(NA)	(X)	(X)	1 514.4
29111 —	Gasoline, including finished base stocks and blending agents <sup>4</sup> -----	(NA)	(X)	(X)	95 114.7	(NA)	(X)	(X)	41 840.4
29111 11	Aviation gasoline, except jet fuel ----- mil barrels..	24	(S)	117.0	4 857.4	17	(S)	67.5	1 092.4
29111 31	Motor gasoline ----- do..	104	(S)	2 284.8	90 211.9	100	20.7	2 603.7	40 735.5
29111 00	Gasoline, including finished base stocks and blending agents, n.s.k. -----	(NA)	(X)	(X)	45.3	(NA)	(X)	(X)	12.5
29112 —	Jet fuel -----	(NA)	(X)	(X)	14 862.4	(NA)	(X)	(X)	5 358.9
29112 11	Naphtha type ----- mil barrels..	54	(S)	122.8	2 997.4	51	2.3	83.7	1 190.4
29112 13	Kerosene type ----- do..	55	(S)	306.4	11 814.2	39	2.6	289.5	4 168.5
29112 00	Jet fuel, n.s.k. -----	(NA)	(X)	(X)	50.8	(NA)	(X)	(X)	-
29113 —	Kerosene: -----								
29113 00	Kerosene, except jet fuel ----- mil barrels..	48	(S)	47.0	1 886.6	51	4.7	63.9	892.9
29114 —	Light fuel oils -----	(NA)	(X)	(X)	37 302.6	(NA)	(X)	(X)	17 509.4
29114 12	Distillate fuel oil, including grades No. 1, 2, light diesel-type, light gas-enrichment oils, etc. ----- mil barrels..	125	(S)	980.0	36 177.4	124	23.5	1 229.1	17 183.1
29114 14	No. 4 type fuel oil ----- do..	33	(S)	28.3	963.5	32	4.3	24.0	315.6
29114 00	Light fuel oils, n.s.k. -----	(NA)	(X)	(X)	161.7	(NA)	(X)	(X)	10.7
29115 —	Heavy fuel oil: -----								
29115 00	Heavy fuel oil, including grades No. 5, 6, heavy diesel-type, heavy gas-enrichment oils, etc. ----- mil barrels..	120	(S)	445.6	11 390.6	116	84.2	567.1	6 793.9
29118 —	Unfinished oils and lubricating oil base stock <sup>5</sup> -----	(NA)	(X)	(X)	8 065.9	(NA)	(X)	(X)	2 887.8
29118 13	Unfinished oils, naphthenic and paraffinic <sup>6</sup> ----- mil barrels..	45	(S)	123.3	4 379.6	28	96.4	91.7	1 205.5
29118 16	Naphtha and other oils for use as petrochemical feedstocks, excluding carbon black ----- do..	19	(S)	53.9	1 710.0	18	4.6	57.6	678.5
29118 17	Carbon black feedstock ----- do..	15	(S)	15.1	394.8	15	(S)	10.5	128.3
	Lubricating oil petroleum base stocks (for blending, compounding, and grease manufacture) <sup>7</sup> : -----								
29118 51	Bright stock ----- do..	14	(S)	3.1	200.1	13	12.2	3.6	107.7
29118 52	Neutral stock ----- do..	24	(S)	16.3	1 013.5	17	20.3	24.3	659.1
29118 54	Black oils ----- do..	5	(S)	.1	6.4	4	.1	2.6	26.2
29118 56	Red and pale oils ----- do..	10	(S)	3.0	56.4	4	3.7	1.9	39.6
29118 58	Other oils ----- do..	11	(S)	*9.4	255.1	9	1.3	2.5	40.5
29118 00	Unfinished oils and lubricating oil base stock, n.s.k. -----	(NA)	(X)	(X)	50.0	(NA)	(X)	(X)	2.4
29119 —	Asphalt <sup>8</sup> -----	(NA)	(X)	(X)	2 980.3	(NA)	(X)	(X)	2 216.7
29119 21	Paving grade asphalts ----- mil barrels..	62	(S)	95.2	2 187.5	55	8.9	154.5	1 594.9
29119 31	Roofing grade asphalts ----- do..	26	(S)	17.7	452.3	27	(S)	23.9	266.3
29119 41	Miscellaneous asphalts, n.e.c. ----- do..	24	(S)	*10.4	285.6	34	(S)	32.4	355.5
29119 00	Asphalt, n.s.k. -----	(NA)	(X)	(X)	54.8	(NA)	(X)	(X)	-
2911A —	Liquefied refinery gases, including other aliphatics (feed stock and other uses), made in a refinery -----	(NA)	(X)	(X)	4 454.7				
2911A 21	Chemical raw material, including synthetic rubber components <sup>9</sup> ----- mil barrels..	53	(S)	156.7	3 536.2				
2911A 22	Other uses ----- do..	35	(S)	40.3	918.5				
2911A 00	Liquefied refinery gases, including other aliphatics (feed stock and other uses), made in a refinery, n.s.k. -----	(NA)	(X)	(X)	-	(NA)	(X)	( <sup>10</sup> )	104 500.8
2911B —	Liquefied refinery gases, including other aliphatics (feed stock and other uses), not made in a refinery -----	(NA)	(X)	(X)	3 941.4				
2911B 32	Chemical raw material, including synthetic rubber components <sup>9</sup> ----- mil barrels..	29	(S)	155.3	3 643.6				
2911B 33	Other uses ----- do..	8	(S)	(S)	297.7				
2911B 00	Liquefied refinery gases, including other aliphatics (feed stock and other uses), not made in a refinery, n.s.k. -----	(NA)	(X)	(X)	-				
2911C —	Aromatics, made from purchased refinery products -----	(NA)	(X)	(X)	1 353.7				
2911C 58	Chemical raw material <sup>9</sup> ----- mil barrels..	13	(S)	(D)	(D)				
2911C 59	Other uses ----- do..	2	-	(D)	(D)	(NA)	(X)	( <sup>11</sup> )	( <sup>11</sup> )
2911C 00	Aromatics, made from purchased refinery products, n.s.k. -----	(NA)	(X)	(X)	-				
2911D —	Other finished petroleum products (including waxes) -----	(NA)	(X)	(X)	5 609.3	(NA)	(X)	(X)	( <sup>12</sup> )
2911D 11	Petrolatum ----- mil barrels..	11	(S)	**3.2	122.3	14	.3	2.8	72.0
2911D 21	Petroleum coke ----- 1,000 s tons..	35	(S)	20 105.5	802.5	26	1 544.1	9 418.5	380.7
2911D 31	Road oil <sup>13</sup> ----- mil barrels..	6	(S)	.8	21.5	14	(S)	3.3	36.5
2911D 41	Still gas ----- bil cu ft..	10	(S)	53.5	218.8	10	-	52.9	131.9
2911D 51	Special naphthas <sup>14</sup> ----- mil barrels..	24	(S)	16.6	629.4	25	.3	29.4	533.5
	Aromatics, made in refineries: -----								
2911D 55	Chemical raw material <sup>9</sup> ----- do..	23	(S)	45.8	2 402.7				
2911D 57	Other uses ----- do..	9	(S)	11.8	467.7	(NA)	(X)	( <sup>11</sup> )	( <sup>11</sup> )
	Wax, total ----- do..	(NA)	(S)	(S)	440.2	(NA)	(S)	15.7	234.4
	Made in refineries: -----								
2911D 62	Microcrystalline <sup>16</sup> ----- do..	8	(S)	(S)	41.0	16	.2	151.8	1572.4
	Crystalline: -----								
2911D 72	Fully refined ----- do..	11	(S)	2.7	197.4	15	(S)	153.1	15101.6
2911D 82	Other ----- do..	12	(S)	**2.1	100.3	12	(S)	1510.8	1560.4
2911D 92	Not made in refineries ----- do..	12	(S)	117.8	101.5	(NA)	(S)	( <sup>15</sup> )	( <sup>15</sup> )
2911D 99	Other finished petroleum products, n.e.c. ----- do..	37	(S)	(S)	504.3	27	(S)	27.7	379.7
2911D 00	Other finished petroleum products (including waxes), n.s.k. -----	(NA)	(X)	(X)	-	(NA)	(X)	(X)	112.0
29110 00	Products of petroleum refining, n.s.k. (see note) -----	(NA)	(X)	(X)	1 521.2				

See footnotes at end of table.

**Table 6a-1. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1982 and 1977—Con.**

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 product code	Product	1982				1977			
		Number of companies with shipments of \$100,000 or more	Receipts <sup>2</sup> (quantity)	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Receipts <sup>2</sup> (quantity)	Product shipments	
				Quantity <sup>3</sup>	Value (million dollars)			Quantity	Value (million dollars)
	<b>PETROLEUM PRODUCTS—Con.</b>								
29117 — 29920 —	Lubricating oils and greases (see table 6a-2) -----	(NA)	(X)	(X)	5 609.7	(NA)	(X)	(X)	3 232.8
29117 21 29920 21	Lubricating and similar oils <sup>17</sup> ----- mil barrels..	(NA)	(S)	*60.9	4 813.8	(NA)	4.5	85.7	2 762.6
29117 31 29920 31	Lubricating greases <sup>18</sup> ----- do..	(NA)	(S)	**3.9	466.3	(NA)	(S)	4.4	228.2
29117 00 29920 00 29920 02	Lubricating oils and greases, n.s.k.(see note) -----	(NA)	(X)	(X)	329.6	(NA)	(X)	(X)	242.0

1982 product code	Product	1982				1977			
		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>			
			Quantity <sup>2</sup>	Value (million dollars)		Quantity <sup>2</sup>	Value (million dollars)		
	<b>PAVING MIXTURES AND BLOCKS</b>								
2951- —	<b>Total</b> -----	(NA)	(X)	2 881.0	(X)	(X)	1 518.6		
29510 —	Paving mixtures and blocks:								
29510 11	Liquid asphalt and tar paving materials: Emulsified asphalt, including additives -----1,000 barrels..	81	**13	161.0	376.7	58	(S)	207.4	
29510 15	Other liquid asphalt and tar paving materials, including cut-backs ----- do..	35	**3	595.7	109.8	35	(S)	60.0	
29510 51	Asphalt and tar paving mixtures and blocks, including bituminous or asphaltic concrete, and asphaltic paving cements -----	362	(X)	1 879.9	303	(X)	874.4		
29510 98	Other paving mixtures and blocks, except brick, concrete, granite, or stone -----	22	(X)	48.6	19	(X)	68.8		
29510 00	Paving mixtures and blocks, n.s.k., typically for establishments with 5 employees or more (see note) -----	(NA)	(X)	447.7	(X)	(X)	274.2		
29510 02	Paving mixtures and blocks, n.s.k., typically for establishments with less than 5 employees (see note) -----	(NA)	(X)	18.3	(X)	(X)	33.8		
	<b>ASPHALT FELTS AND COATINGS</b>								
2952- —	<b>Total</b> -----	(NA)	(X)	2 633.2	(NA)	(X)	1 828.6		
29521 —	Asphalt and tar saturated felts and boards for nonbuilding use -----	(NA)	(X)	64.4	(NA)	(X)	99.5		
29521 11	Felts, for other than building purposes (automotive, etc.) -----	4	(X)	31.3	6	(S)	47.6		
29521 31	Asphalt and tar products, except felts, coatings, cement, for nonbuilding use (i.e., automotive, etc.) -----1,000 s tons..	15	(S)	31.5	12	*264.3	42.4		
29521 00	Asphalt and tar saturated felts and boards for nonbuilding use, n.s.k. -----	(NA)	(X)	1.6	(NA)	(X)	9.5		
29522 —	Roofing asphalts and pitches, coatings, and cements -----	(NA)	(X)	466.8	(NA)	(X)	263.4		
29522 12	Roofing asphalt -----1,000 s tons..	18	932.3	173.7	12	(D)	(D)		
29522 51	Asphaltic roofing coatings and cements:								
29522 55	Fibrited asphaltic coatings -----mil gal..	34	45.3	106.9	23	(S)	60.2		
29522 61	Nonfibrited asphaltic coatings ----- do..	26	**7.6	18.3	17	(S)	21.5		
29522 98	Asphaltic roofing cements ----- do..	30	(S)	76.3	21	*36.1	50.8		
29522 00	Other roofing asphalts and pitches, coatings, and cements, including coal tar base coatings, cements, and roofing pitches -----	36	(X)	76.5	15	(X)	(D)		
29522 00	Roofing asphalts and pitches, coatings, and cements, n.s.k. -----	(NA)	(X)	15.1	(NA)	(X)	(D)		
29523 —	Prepared asphalt and tar roofing and siding products (see table 6a-3) -----	(NA)	(X)	2 030.8	(NA)	(X)	1 405.3		
29523 21	Roll roofing and cap sheets: Smooth-surfaced, organic base sheets (including sanded, talc, mica, and other fine material surfacing, coated base sheet, and coated ply felts) ----- mil sales sq..	15	7.9	47.4	20	20.1	109.1		
29523 22	Smooth surfaced fiberglass base sheets ----- do..	13	16.1	93.7					
29523 23	Mineral-surfaced, organic cap sheets (including 19-in. selvage edged) ----- do..	18	11.9	129.9					
29523 24	Mineral-surfaced, fiberglass cap sheets ----- do..	10	2.3	29.5					
29523 25	Shingles: Organic base: 235-240 lb/sq ----- do..	15	16.6	306.6	(NA)	65.6	941.9		
29523 26	All other weights (excluding laminated) ----- do..	8	6.3	117.7					
29523 27	Inorganic base: 215-235 lb/sq ----- do..	12	30.5	577.5					
29523 28	All other weights (excluding laminated) ----- do..	8	6.0	127.7					
29523 29	Organic and/or inorganic base laminated or multi- layered shingles ----- do..	6	1.5	55.5					

See footnotes at end of table.

**Table 6a-1. Product and Product Classes—Quantity and Value of Shipments by All Producers: 1982 and 1977—Con.**

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 product code	Product	1982			1977		
		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Product shipments <sup>1</sup>	
			Quantity <sup>2</sup>	Value (million dollars)		Quantity <sup>2</sup>	Value (million dollars)
	<b>ASPHALT FELTS AND COATINGS—Con.</b>						
29523 —	Prepared asphalt and tar roofing and siding products (see table 6a-3) —Con.						
	Shingles —Con.						
29523 31	Individual shingles, organic or inorganic base, all styles ----- mil sales sq--	13	1.4	34.2	12	1.7	23.9
29523 33	Mineral-surfaced insulating board base siding (all types and finishes), organic or inorganic base ----- do--	1	(D)	( <sup>19</sup> )	7	.5	6.8
29523 53	Fiberglass ply felts, coated ----- do--	8	15.4	64.3	(NA)	(X)	( <sup>20</sup> )
29523 54	Saturated felts, asphalt and tar, for built-up roofing systems ----- 1,000 s tons--	17	291.0	84.4	22	824.1	150.3
29523 56	Saturated asphalt felts, nonperforated ----- do--	17	283.7	63.9	(NA)	(X)	( <sup>20</sup> )
29523 99	Other prepared asphalt and tar products for roofing and siding, including board products and sheathing and felt base roll form and shingle form -----	16	(X)	<sup>19</sup> 278.0	16	(X)	<sup>20</sup> 57.5
29523 00	Prepared asphalt and tar roofing and siding products, n.s.k. -----	(NA)	(X)	20.6	(NA)	(X)	26.3
29520 00	Asphalt felts and coatings, n.s.k., typically for establishments with 5 employees or more (see note) -----	(NA)	(X)	62.5	(NA)	(X)	35.6
29520 02	Asphalt felts and coatings, n.s.k., typically for establishments with less than 5 employees (see note) -----	(NA)	(X)	8.7	(NA)	(X)	24.9
	<b>PETROLEUM AND COAL PRODUCTS, N.E.C.</b>						
2999- —	<b>Total</b> -----	(NA)	(X)	700.3	(NA)	(X)	494.6
29990 —	Petroleum and coal products, n.e.c.:						
29990 15	Packaged fuel and fuel briquettes, except wood charcoal briquettes ----- 1,000 s tons--	2	(D)	(D)	2	(D)	(D)
29990 91	Calcined petroleum coke ----- do--	17	4 193.7	568.0	14	4 498.7	381.8
29990 98	Other petroleum and coal products -----	27	(X)	67.4	28	(X)	<sup>50</sup> 4
29990 00	Petroleum and coal products, n.e.c., n.s.k., typically for establishments with 5 employees or more (see note) -----	(NA)	(X)	(D)	(NA)	(X)	(D)
29990 02	Petroleum and coal products, n.e.c., n.s.k., typically for establishments with less than 5 employees (see note) -----	(NA)	(X)	7.1	(NA)	(X)	12.0

Note: In 1982 Census of Manufactures, data for establishments of small single-unit companies with up to 20 employees were estimated from administrative-record data rather than data actually collected from respondents. Employment cutoff used for administrative records for each industry and shipments figures are included in code ending with "002". In both 1982 and 1977 Censuses of Manufactures, products not completely identified on standard forms were coded in appropriate product class (five-digit) followed by "00" or to appropriate product group code (four-digit) followed by "000".

<sup>1</sup>Data reported by all producers, not just those with shipments of \$100,000 or more.

<sup>2</sup>Reporting companies were requested to report quantities of refined petroleum received in refineries for further processing and to classify items in the same manner as they were billed by shipper, regardless of how refinery (or blending and compounding establishment) would otherwise classify item.

<sup>3</sup>For some establishments, data have been estimated from central unit values which are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: \* 10 to 19 percent estimated; \*\* 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

<sup>4</sup>Includes all finished gasolines, finished base stocks and blending agents, such as alkylate, polymers (dimer, codimer, etc.), hydropolymers (hydrodimer, hydrocodimer, etc.), cumene, isopetane, isohexane, neohexane, iso-octane, motor benzol (benzene), and other blending agents derived from petroleum. Excludes natural gasoline derived from natural gas.

<sup>5</sup>Although respondents were requested to report receipts in same manner as billed by shipper, data indicate that items billed as other oils by shipper were sometimes reported as unfinished oils or lubricating oil petroleum base stocks by refinery (or blending and compounding plant) receiving these oils.

<sup>6</sup>Includes such products as cracking stock, unfinished gasoline requiring further distillation, naphtha stocks, slops, wax distillate, and other unfinished petroleum oils. Excludes lubricating oil base stocks, natural gasoline, and cycle condensates.

<sup>7</sup>Includes light, medium, heavy natural, and residual stocks.

<sup>8</sup>Includes asphalt and fluxes for paving, roofing, waterproofing, briquetting, mastic pipe coating, and molding composition; cutback asphalt, emulsified asphalt, and fluxes produced in petroleum refineries; and other asphaltic products, except road oil and fuel for heating purposes.

<sup>9</sup>Detailed statistics for liquefied refinery gases and aromatics used as chemical raw material are published by U.S. International Trade Commission in their annual report, Synthetic Organic Chemicals, U.S. Production and Sales.

<sup>10</sup>For 1977 detail, see 1977 Census of Manufactures, volume II, part 2, table 6a, page 29A-19.

<sup>11</sup>Separate data for product class 2911C and product codes 2911D 55 and 2911D 57 are not available. Combined total for aromatics in 1977 was \$2,989.3 million.

<sup>12</sup>For 1977, total for product class 2911D was not available because of restructuring of product lines for aromatics. See footnote 11.

<sup>13</sup>Represents residual asphaltic oil used for surface treatment of roads and highways.

<sup>14</sup>Includes petroleum ether, rubber solvent, mineral spirits (petroleum spirits), varnish makers' and painters' naphtha, high-solvency naphtha, benzol diluent, lacquer diluent, cleaners' naphtha, Stoddard solvent, extraction solvents, and other petroleum distillates shipped as solvents.

<sup>15</sup>Separate data for wax made in refineries and wax not made in refineries were not available in 1977. Data shown for product codes 2911D 62, 2911D 72, and 2911D 82 represent total wax, regardless of where made.

<sup>16</sup>Represents amorphous paraffin of melting point not less than 145°.

<sup>17</sup>Includes oils for lubricating purposes and such nonlubricating purposes as transformer oil, hydraulic oil, quenching oil, and liquid rust preventative.

<sup>18</sup>Includes greases for aviation, automotive, industrial, and railroad uses; launching grease, cutting, drawing, and grinding compounds; and paste. Also includes paste rust-preventative compounds and thread compounds.

<sup>19</sup>For 1982, product code 29523 33 is included with product code 29523 99 to avoid disclosing data for individual companies.

<sup>20</sup>For 1977, product codes 29523 53 and 29523 56 were included with product code 29523 99.

Table 6a-2. Selected Products Primary to More Than One Industry—Quantity and Value of Shipments by Industry: 1982 and 1977

[Includes quantity and value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of a company to another establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 product code	Product	1982				1977			
		Number of companies with shipments of \$100,000 or more	Receipts <sup>2</sup> (quantity)	Product shipments <sup>1</sup>		Number of companies with shipments of \$100,000 or more	Receipts <sup>2</sup> (quantity)	Product shipments <sup>1</sup>	
				Quantity <sup>3</sup>	Value (million dollars)			Quantity <sup>3</sup>	Value (million dollars)
29117 — 29920 —	Lubricating oils and greases ----- mil barrels..	(NA)	(X)	(X)	5 609.7	(NA)	(X)	(X)	3 232.8
29117 — 29920 —	Made in petroleum refineries ----- do..	(NA)	(X)	(X)	2 891.4	(NA)	(X)	(X)	1 718.9
	Not made in petroleum refineries ----- do..	(NA)	(X)	(X)	2 718.3	(NA)	(X)	(X)	1 514.0
29117 21 29920 21	Lubricating and similar oils ----- do..	(NA)	(S)	*60.9	4 813.8	(NA)	4.5	85.7	2 762.6
29117 21 29920 21	Made in petroleum refineries ----- do..	32	(S)	37.3	2 748.9	28	.3	50.9	1 662.5
	Not made in petroleum refineries ----- do..	201	(S)	*23.6	2 065.0	148	4.2	34.8	1 100.1
29117 31 29920 31	Lubricating greases ----- do..	(NA)	(S)	**3.8	466.3	(NA)	(S)	4.4	228.2
29117 31 29920 31	Made in petroleum refineries ----- do..	17	(S)	1.2	142.5	18	(S)	1.0	56.3
	Not made in petroleum refineries ----- do..	66	(S)	**2.6	323.7	49	.5	3.4	171.9
29117 00 29920 00 29920 02	Lubricating oils and greases, n.s.k. -----	(NA)	(X)	(X)	329.6	(NA)	(X)	(X)	242.0
29117 00	Made in petroleum refineries -----	(NA)	(X)	(X)	-	(NA)	(X)	(X)	-
29920 00	Not made in petroleum refineries, typically for establishments with 5 employees or more (see note) -----	(NA)	(X)	(X)	309.7	(NA)	(X)	(X)	210.9
29920 02	Not made in petroleum refineries, typically for establishments with less than 5 employees (see note) -----	(NA)	(X)	(X)	19.9	(NA)	(X)	(X)	31.1

Note: In 1982 Census of Manufactures, data for establishments of small single-unit companies with up to 20 employees were estimated from administrative record data rather than data actually collected from respondents. Employment cutoff used for administrative records for each industry and shipments figures are included in code ending with "002". In both 1982 and 1977 Censuses of Manufactures, products not completely identified on standard forms were coded in appropriate product class (five-digit) followed by "00" or to appropriate product group code (four-digit) followed by "000".

<sup>1</sup>Data reported by all producers, not just those with shipments of \$100,000 or more.  
<sup>2</sup>Reporting companies were requested to report quantities of refined petroleum received in refineries for further processing and to classify items in the same manner as they were billed by shipper, regardless of how refinery (or blending and compounding establishment) would otherwise classify item.  
<sup>3</sup>For some establishments, data have been estimated from central unit values which are based on quantity-value relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: \* 10 to 19 percent estimated; \*\* 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

[For meaning of abbreviations and symbols, see introductory text]

Source: Current Industrial Report MA-29A, Asphalt and Tar Roofing and Siding Products.

<sup>1</sup>For 1982, product code 29523 16 was combined with product code 29523 17 to avoid disclosing data for individual companies.

<sup>2</sup>Data for these items were not collected in 1977.

<sup>3</sup>Does not include data for product code 29523 53.

[Million dollars. Product classes covered are those that are economically significant and whose production is geographically dispersed, provided dispersion is not approximated by data in table 2. Also, product classes are not shown if they are miscellaneous or "not specified by type" classes. Statistics for some States are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 1982. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendices]

See footnotes at end of table.

**Table 6b. Product Classes—Value of Shipments by All Producers for Specified States: 1982 and 1977—Con.**

[Million dollars. Product classes covered are those that are economically significant and whose production is geographically dispersed, provided dispersion is not approximated by data in table 2. Also, product classes are not shown if they are miscellaneous or "not specified by type" classes. Statistics for some States are withheld because they are either less than \$2 million in product class shipments or they disclose data for individual companies in 1982. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

Product class and geographic area	1982 value of product shipments	1977 value of product shipments	Product class and geographic area	1982 value of product shipments	1977 value of product shipments
<b>29117, LUBRICATING OILS AND GREASES MADE IN REFINERIES</b>			<b>2911C, AROMATICS MADE FROM PURCHASED REFINERY PRODUCTS</b>		
United States .....	2 891.4	1 718.9	United States .....	1 353.7	(NA)
California .....	245.7	125.1	Texas .....	1 143.8	(NA)
Kansas .....	97.2	93.9			
Pennsylvania .....	531.2	335.3	<b>2911D, OTHER FINISHED PETROLEUM PRODUCTS (INCLUDING WAXES)</b>		
Texas .....	868.3	695.7	United States .....	5 609.3	(NA)
<b>29118, UNFINISHED OILS AND LUBRICATING OIL BASE STOCK</b>			California .....	721.7	(NA)
United States .....	8 065.9	2 887.8	Illinois .....	253.4	(NA)
Arkansas .....	23.8	(CC)	Kansas .....	72.9	(NA)
California .....	1 821.2	456.3	Louisiana .....	657.9	(NA)
Illinois .....	112.4	196.4	Michigan .....	4.4	(NA)
Kansas .....	6.2	(CC)	New Jersey .....	26.3	(NA)
Louisiana .....	1 786.7	412.6	Oklahoma .....	200.4	(NA)
New Jersey .....	102.6	(GG)	Pennsylvania .....	299.9	(NA)
Oklahoma .....	230.4	51.5	Texas .....	2 718.4	(NA)
Pennsylvania .....	305.8	268.6			
Texas .....	2 972.9	1 172.0	<b>29521, ASPHALT AND TAR SATURATED FELTS AND BOARDS FOR NONBUILDING USE</b>		
Wyoming .....	15.3	(CC)	United States .....	64.4	99.5
<b>29119, ASPHALT</b>			Arkansas .....	4.8	(AA)
United States .....	2 980.3	2 216.7			
Arkansas .....	88.5	(FF)	<b>29522, ROOFING ASPHALTS AND PITCHES, COATINGS, AND CEMENTS</b>		
California .....	346.4	481.4	United States .....	466.8	263.4
Indiana .....	143.7	124.0	California .....	45.7	19.5
Kansas .....	107.7	87.0	Florida .....	28.6	10.4
Louisiana .....	152.5	(GG)	Georgia .....	9.5	(CC)
Montana .....	72.7	32.3	Illinois .....	34.8	23.9
New York .....	13.0	(EE)	Minnesota .....	4.1	(BB)
Ohio .....	46.8	124.2	Missouri .....	17.5	9.6
Oklahoma .....	83.7	55.3	New Jersey .....	45.5	27.3
Texas .....	268.0	212.3	New York .....	17.5	(BB)
Wyoming .....	78.3	48.6	Ohio .....	68.4	58.0
<b>2911A, LIQUEFIED REFINERY GASES, INCLUDING OTHER ALIPHATICS, MADE IN A REFINERY</b>			Oregon .....	7.9	3.8
United States .....	4 454.7	(NA)	Pennsylvania .....	30.7	11.5
California .....	193.8	(NA)	Tennessee .....	7.8	4.5
Illinois .....	178.7	(NA)	Texas .....	62.7	47.5
Kansas .....	44.1	(NA)	Washington .....	10.4	(AA)
Louisiana .....	842.7	(NA)			
Montana .....	12.1	(NA)	<b>29523, PREPARED ASPHALT AND TAR ROOFING AND SIDING PRODUCTS</b>		
Oklahoma .....	141.8	(NA)	United States .....	2 030.8	1 405.3
Pennsylvania .....	87.8	(NA)	Alabama .....	103.9	60.9
Texas .....	2 353.3	(NA)	Arkansas .....	67.0	42.5
Utah .....	11.8	(NA)	California .....	229.3	150.1
Washington .....	22.3	(NA)	Georgia .....	122.1	80.7
Wyoming .....	5.9	(NA)	Illinois .....	153.8	167.2
<b>2911B, LIQUEFIED REFINERY GASES, INCLUDING OTHER ALIPHATICS, NOT MADE IN A REFINERY</b>			Indiana .....	69.8	41.8
United States .....	3 941.4	(NA)	Maryland .....	41.1	(FF)
Kentucky .....	25.7	(NA)	Massachusetts .....	56.8	(GG)
Louisiana .....	1 394.0	(NA)	Minnesota .....	78.6	64.0
Texas .....	2 241.6	(NA)	New Jersey .....	130.5	112.1
			North Carolina .....	67.1	(EE)
			Ohio .....	137.3	78.0
			Oklahoma .....	45.3	(FF)
			Oregon .....	42.5	30.3
			Pennsylvania .....	43.3	66.2
			South Carolina .....	62.0	(FF)
			Texas .....	225.5	106.2

Note: For 1977, the following value ranges (in million dollars) substitute for actual figures withheld to avoid disclosing data for individual companies: AA—less than \$2.0 but not 0; BB—\$2.0 to \$4.9; CC—\$5.0 to \$9.9; EE—\$10.0 to \$19.9; FF—\$20.0 to \$49.9; GG—\$50.0 or more.

**Table 6c. Product Classes—Value Shipped by All Producers: 1982 and Earlier Years**

[Million dollars. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

1982 product code	Product class	1982	1981 <sup>1</sup>	1980 <sup>1</sup>	1979 <sup>1</sup>	1978 <sup>1</sup>	1977	1972	1967
2911-	<b>Petroleum refining</b> -----	191 374.7	207 554.8	182 099.6	133 359.3	93 745.3	88 589.5	24 772.8	19 248.7
29111	Gasoline, including finished base stocks and blending agents -----	95 114.7	101 940.1	90 516.3	62 740.9	45 529.1	41 840.4	13 029.6	9 844.2
29112	Jet fuel -----	14 862.4	14 802.4	13 152.1	8 383.2	5 719.5	5 358.9	1 371.6	1 100.4
29113	Kerosene -----	1 886.6	1 704.3	1 482.9	1 305.8	797.4	892.9	372.4	430.5
29114	Light fuel oils -----	37 302.6	37 435.6	32 241.4	25 631.9	17 663.8	17 509.4	4 407.7	3 305.7
29115	Heavy fuel oil -----	11 390.6	14 228.3	12 010.7	9 038.5	6 599.9	6 793.9	1 107.2	566.1
29117	Lubricating oils and greases made in refineries -----	2 891.4	3 841.4	3 338.9	2 624.5	1 846.8	1 718.9	894.8	883.7
29118	Unfinished oils and lubricating oil base stock -----	8 065.9	6 992.3	7 198.9	5 311.8	3 133.4	2 887.8	733.7	613.2
29119	Asphalt -----	2 980.3	3 317.2	3 139.6	2 625.5	2 131.4	2 216.7	671.5	424.2
2911A	Liquefied refinery gases, including other aliphatics made in a refinery -----	4 454.7	11 555.3	9 682.0	7 859.9	4 822.7	4 500.8	1 152.9	1 135.7
2911B	Liquefied refinery gases, including other aliphatics not made in a refinery -----	3 941.4							
2911C	Aromatics made from purchased refinery products -----	1 353.7	11 737.9	9 336.8	7 837.3	5 501.2	4 869.8	1 031.4	944.9
2911D	Other finished petroleum products (including waxes) -----	5 609.3							
29110	Petroleum refining products, n.s.k. -----	1 521.2							
29510	<b>Paving mixtures and blocks</b> -----	2 881.0	2 278.4	2 312.8	1 963.3	1 931.0	1 518.6	893.4	529.6
2952-	<b>Asphalt felts and coatings</b> -----	2 633.2	2 763.5	2 731.2	2 698.8	2 386.8	1 828.6	902.2	519.4
29521	Asphalt and tar saturated felts and boards for nonbuilding use -----	64.4	86.2	87.7	119.9	122.7	99.5	34.2	27.5
29522	Roofing asphalts and pitches, coatings, and cements -----	466.8	777.7	759.4	666.3	427.5	263.4	155.3	101.4
29523	Prepared asphalt and tar roofing and siding products -----	2 030.8	1 851.2	1 847.2	1 881.7	1 778.2	1 405.3	690.6	375.2
29520	Asphalt felts and coatings, n.s.k. -----	71.2	48.4	36.9	30.9	(S)	60.5	22.1	15.3
29920	<b>Lubricating oils and greases not made in a refinery</b> -----	2 718.3	2 896.9	2 529.5	2 271.1	1 786.9	1 514.0	642.0	443.4
29990	<b>Petroleum and coal products, n.e.c.</b> -----	700.3	889.1	739.9	594.8	499.4	494.6	139.2	79.6

<sup>1</sup>Figures are estimates derived from a representative sample of manufacturing establishments canvassed in annual survey of manufactures and, therefore, may differ from results that would be obtained from a complete canvass of all manufacturing establishments. Standard errors associated with estimates are published in annual survey of manufactures volumes for this period.

**Table 7a. Materials Consumed by Kind: 1982 and 1977**

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
	<b>INDUSTRY 2911, PETROLEUM REFINING</b>				
	Materials, containers, and supplies -----	(X)	166 875.0	(X)	72 062.0
	Crude petroleum, including field condensate ----- mil barrels..	4 355.2	137 870.1	5 108.5	60 121.4
131111	Domestic ----- do..	3 163.5	99 511.7	2 798.5	30 387.8
131112	Foreign ----- do..	1 191.7	38 358.4	2 310.0	29 733.6
291181	Foreign unfinished oils (received from foreign countries for further processing) ----- do..	17.1	557.9	14.9	202.9
	Natural gas liquids:				
132128	Ethane (C <sub>2</sub> ), at least 80 percent purity ----- do..	*55.0	475.0	26.1	181.5
132129	Propane (C <sub>3</sub> ), at least 80 percent purity ----- do..	42.2	682.7	26.7	204.0
132120	Butane (C <sub>4</sub> ), at least 80 percent purity ----- do..	107.1	3 105.0	83.6	889.8
132124	Gas mixtures (C <sub>2</sub> , C <sub>3</sub> , C <sub>4</sub> ) ----- do..	32.9	698.6	38.1	223.3
132125	Isopentane and natural gasoline ----- do..	67.0	2 046.1	73.1	742.9
132126	Plant condensate ----- do..	10.4	332.9	13.5	122.2
132127	Other natural gas liquids ----- do..	17.4	562.2	42.0	507.1
291107	Benzol (benzene) (100 percent C <sub>6</sub> H <sub>6</sub> ) ----- do..	1.4	74.1	.5	20.0
286519	Toluene and xylene (100 percent basis) ----- mil lb..	4 259.3	459.6	(X)	( <sup>3</sup> )
	Additives, except animal and vegetable oils:				
280011	Antioxidants, antiknock compounds, and inhibitors ----- do..	888.1	749.5	(NA)	608.9
280012	Other additives, including soaps and detergents ----- do..	805.7	448.9	(NA)	241.9
207001	Animal and vegetable oils ----- do..	(D)	(D)	(NA)	4.2
281980	Chemical catalytic preparations ----- do..	(X)	678.8	(X)	246.9
281238	Caustic soda (sodium hydroxide, 100 percent NaOH) ----- 1,000 s tons..	**309.1	80.1	*371.0	50.6
281931	Sulfuric acid (100 percent H <sub>2</sub> SO <sub>4</sub> ), except spent ----- do..	(S)	120.1	1 365.0	63.6
	Containers:				
340001	Metal ----- do..	(X)	65.1	(X)	73.4
260091	Paper and paperboard ----- do..	(X)	(D)	(X)	20.7
265522	Cans, bodies with combinations of fiber and other materials (foil, plastics, etc.) with metal ends ----- do..	(X)	90.8	(X)	83.4
290004	Cost of materials received from petroleum refineries and lube manufacturers (represents costs of materials for which quantities are shown in the receipts column of table 6a-1) -----	(X)	7 872.1	(X)	4 187.8
970099	All other materials and components, parts, containers, and supplies -----	(X)	8 443.5	(X)	<sup>32</sup> 922.9
971000	Materials, containers, and supplies, n.s.k. <sup>2</sup> -----	(X)	1 426.7	(X)	342.6

See footnotes at end of table.

Table 7a. Materials Consumed by Kind: 1982 and 1977—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1982 material code	Material	1982		1977	
		Quantity <sup>1</sup>	Delivered cost (million dollars)	Quantity <sup>1</sup>	Delivered cost (million dollars)
	<b>INDUSTRY 2992, LUBRICATING OILS AND GREASES</b>				
	Materials, containers, and supplies -----	(X)	1 790.3	(X)	969.3
	Additives, except animal and vegetable oils:				
280011	Antioxidants, antiknock compounds, and inhibitors ----- mil lb..	*252.0	88.5	(NA)	41.0
280012	Other additives, including soaps and detergents ----- do..	251.5	136.0	(NA)	73.0
207001	Animal and vegetable oils ----- do..	**74.3	16.8	(NA)	28.3
281980	Chemical catalytic preparations ----- (X)	(D)	(D)	(X)	3.6
281238	Caustic soda (sodium hydroxide, 100 percent NaOH) ----- 1,000 s tons..	*10.4	2.3	15.9	1.4
281931	Sulfuric acid (100 percent H <sub>2</sub> SO <sub>4</sub> ), except spent ----- do..	(D)	(D)	3.3	.2
	Containers:				
340001	Metal -----	(X)	71.4	(X)	58.2
260091	Paper and paperboard -----	(X)	20.0	(X)	6.8
265522	Cans, bodies with combinations of fiber and other materials (foil, plastics, etc.) with metal ends -----	(X)	51.0	(X)	47.1
290004	Cost of materials received from petroleum refineries and lube manufacturers (represents costs of materials for which quantities are shown in the receipts column of table 6a-2) -----	(X)	762.6	(X)	400.4
970099	All other materials and components, parts, containers, and supplies -----	(X)	302.3	(X)	139.5
971000	Materials, containers, and supplies, n.s.k. <sup>2</sup> -----	(X)	330.1	(X)	169.8
	<b>INDUSTRY 2951, PAVING MIXTURES AND BLOCKS</b>				
	Materials, containers, and supplies -----	(X)	1 834.3	(X)	904.3
	Asphalt:				
291192	Paving grade asphalts ----- mil barrels..	**33.4	780.6	**28.5	362.9
291193	Roofing grade asphalts ----- do..	(S)	6.4	(S)	2.1
291194	Asphalts other than paving and roofing grade ----- do..	(S)	20.7	1.1	14.3
144201	Sand and gravel ----- 1,000 s. tons..	**47 855.0	220.4	*53 532.2	159.0
970099	All other materials and components, parts, containers, and supplies -----	(X)	342.5	(X)	113.1
971000	Materials, containers, and supplies, n.s.k. <sup>2</sup> -----	(X)	463.7	(X)	252.9
	<b>INDUSTRY 2952, ASPHALT FELTS AND COATINGS</b>				
	Materials, containers, and supplies -----	(X)	1 771.1	(X)	1 150.4
	Asphalt:				
291192	Paving grade asphalts ----- mil barrels..	**3	9.5	*1.7	22.3
291193	Roofing grade asphalts ----- do..	28.8	760.2	*29.8	387.9
291194	Asphalts other than paving and roofing grade ----- do..	**1.6	46.7	*1.9	20.3
266101	Roofing felts (unsaturated), other construction paper, and insulating board ----- 1,000 s tons..	629.2	148.4	1 526.2	260.4
322931	Glass fiber, roving, mats, etc. ----- do..	158.2	228.3	30.1	24.2
329501	Roofing granules ----- do..	2 592.1	181.4	3 013.5	129.8
144201	Sand and gravel ----- do..	(S)	22.1	*1 177.0	16.4
970099	All other materials and components, parts, containers, and supplies -----	(X)	262.9	(X)	208.0
971000	Materials, containers, and supplies, n.s.k. <sup>2</sup> -----	(X)	111.6	(X)	81.1

<sup>1</sup>For some establishments, data have been estimated from central unit values which are based on quantity-cost relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: \* 10 to 19 percent estimated; \*\* 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

<sup>2</sup>Total cost of materials of establishments that did not report detailed materials data, including establishments that were not mailed a form.

<sup>3</sup>For 1977, material code 286519 was included with material code 970099.

Table 7b. Fuels Produced and Consumed by Industry 2911, Petroleum Refining: 1982

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

1982 mate- rial code	Fuel	Quantity	Sales value, f.o.b. plant <sup>1</sup> (million dollars)	1982 mate- rial code	Fuel	Quantity	Sales value, f.o.b. plant <sup>1</sup> (million dollars)
291004	Still gas ----- bil cu ft..	778.8	3 600.0	291006	Mixed liquids ----- mil bbl..	22.3	567.1
291005	Mixed fuel gas ----- do..	251.6	1 153.8	960015	Other (distillate oils, petroleum, coke, etc.) ----- do..	46.8	1 273.1

<sup>1</sup>Manufacturers were instructed to estimate sales value, f.o.b. plant, for fuels produced and consumed in same establishment.

**Table 8. Employees Engaged in Construction: 1982**

[For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendixes]

SIC code	Industry	Total		Establishments reporting construction employees				Response coverage ratio C ÷ A
		Employees (1,000)	Payroll (millions)	Total		Engaged in construction		
				Employees (1,000)	Payroll (millions)	Employees (1,000)	Payroll (millions)	
A	B	C	D	E	F	G		
2911	Petroleum refining -----	108.7	3 410.3	32.1	1 083.8	8.5	271.3	.30

Note: Establishments in selected industries were instructed to report number of employees, included in total employment, that were engaged in construction, maintenance, or repair of the plant and utilized as a separate work force. Coverage ratio (column G) indicates proportion of industry employment represented by establishments that reported construction employees. Coverage ratio excludes (a) construction workers not employed by establishment (e.g., working under contract or provided by another establishment of the company); (b) establishments that reported having no construction employees; (c) establishments that did not respond to inquiry; and (d) establishments that were not mailed a form or from which a form had not been received at time data were tabulated.

# APPENDIX A.

## Explanation of Terms

This appendix is in two sections. Section 1 includes items which were requested of all establishments that were mailed census of manufactures forms including annual survey of manufactures (ASM) forms. Note that this section also includes several items (number of establishments and companies, value added, classes of products, and specialization and coverage ratios) that were not included on the report forms but were derived from information collected on the forms. Section 2 covers supplementary items that were requested only from establishments included in the ASM sample. Results of the supplementary ASM inquiries are included in tables 3c and 3d of this report.

### SECTION 1. ITEMS COLLECTED OR DERIVED BASED ON ALL CENSUS OF MANUFACTURES (INCLUDING ASM) REPORT FORMS

**Number of establishments and companies**—As discussed in the Introduction, a separate report was required for each manufacturing establishment (plant) with one employee or more. An establishment is defined as a single physical location where manufacturing is performed. A company, on the other hand, is defined as a business organization consisting of one establishment or more under common ownership or control.

If the company operates at different physical locations, even if the individual locations are producing the same line of goods, a separate report was requested for each location. If the company operates in two or more distinct lines of manufacturing at the same location, a separate report was requested for each activity.

An establishment not in operation for any portion of the year was requested to return the report form with the proper notation in the "Operational Status" section of the form. In addition, the establishment was requested to report data on the number of custodial employees, capital expenditures, inventories, or any shipments from inventories during the portion of the year the plant was in operation.

In this report, data are shown for establishments in operation at any time during the year. A comparison with the number of establishments in operation at the end of the year will be provided in the Introduction to Part 1 of the General Summary subject report.

**Employment and related items**—The regular report forms requested separate information on production workers as of a payroll period for each quarter of the year and on other employees as of the payroll period which included the 12th of March.

**All employees**—This item includes all full-time and part-time employees on the payrolls of operating manufacturing establishments during any part of the pay period ending nearest the 12th of the months specified on the report form. Included are all persons on paid sick leave, paid holidays, and paid vacations during these pay periods. Officers of corporations are included as employees; proprietors and partners of unincorporated firms are excluded. The "all employees" number is the average number of production workers plus the number of other employees in mid-March. The number of production workers is the average for the payroll periods including the 12th of March, May, August, and November.

**Production workers**—This item includes workers (up through the line-supervisor level) engaged in fabricating, processing, assembling, inspecting, receiving, storing, handling, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial and guard services, product development, auxiliary production for plant's own use (e.g., power plant), recordkeeping, and other services closely associated with these production operations at the establishment covered by the report. Employees above the working-supervisor level are excluded from this item.

**All other employees**—This item covers nonproduction employees of the manufacturing establishment including those engaged in factory supervision above the line-supervisor level. It includes sales (including driver salespersons), sales delivery (highway truck drivers and their helpers), advertising, credit, collection, installation and servicing of own products, clerical and routine office function, executive, purchasing, financing, legal, personnel (including cafeteria, medical, etc.), professional, and technical employees. Also included are employees on the payroll of the manufacturing establishment who are engaged in the construction of major additions or alterations to the plant and who are utilized as a separate work force.

In addition to reports sent to operating manufacturing establishments, information on employment during the payroll period which included March 12 and annual payrolls was also requested of auxiliary units (e.g., administrative offices, warehouses, and research and development laboratories) of multiestablishment companies. However, these figures are not included in the totals for individual industries shown in this report. They are included in the general summary and geographic area reports and in the final bound volumes as a separate category.

**Payrolls**—This item includes the gross earnings of all employees on the payroll of operating manufacturing establishments paid in the calendar year 1982. Respondents were told they could follow the definition of payrolls used for calculating the Federal withholding tax. It includes all forms of compensation, such as salaries, wages, commissions, dismissal pay, all bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees' Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. The total includes salaries of officers

of corporations, but excludes payments to proprietors or partners of unincorporated concerns. Also excluded are payments to members of Armed Forces and pensioners carried on the active payroll of manufacturing establishments.

The census definition of payrolls is identical to that recommended to all Federal statistical agencies by the Office of Management and Budget. It should be noted that this definition does not include employers' Social Security contributions or other nonpayroll labor costs, such as employees' pension plans, group insurance premiums, and workers' compensation.

The ASM provides estimates of employers' supplemental labor costs, both those required by Federal and State laws and those incurred voluntarily or as part of collective bargaining agreements. (Supplemental labor costs are explained later in this appendix.)

As in the case of employment figures, the payrolls of separate auxiliary units of multiestablishment companies are not included in the totals for individual industries or industry groups.

**Production-worker hours**—This item covers hours worked or paid for at the plant, including actual overtime hours (not straight-time equivalent hours). It excludes hours paid for vacations, holidays, or sick leave.

**Cost of materials**—This term refers to direct charges actually paid or payable for items consumed or put into production during the year, including freight charges and other direct charges incurred by the establishment in acquiring these materials. It includes the cost of materials or fuel consumed, whether purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year.

The important components of this cost item are (1) all raw materials, semifinished goods, parts, components, containers, scrap, and supplies put into production or used as operating supplies and for repair and maintenance during the year, (2) electric energy purchased, (3) fuels consumed for heat, power, or the generation of electricity, (4) work done by others on materials or parts furnished by manufacturing establishments (contract work), and (5) products bought and resold in the same condition. (See discussion of duplication of data below.)

**Specific materials consumed**—In addition to the total cost of materials, which every establishment was required to report, information was also collected for most manufacturing industries on the consumption of major materials used in manufacturing. The inquiries were restricted to those materials which were important parts of the cost of production in a particular industry and for which cost information was available from manufacturers' records. Information on the specific materials consumed is shown in table 7 if appropriate to the industry. Establishments consuming less than a specified amount (usually \$10,000) of a specific material were not requested to report consumption of that material separately. Also, the cost of materials for the small establishments for which either administrative records or short forms were used was imputed as "not specified by kind." (See the Introduction for the importance of administrative records in the industry.)

**Value of shipments**—This item covers the received or receivable net selling values, f.o.b. plant (exclusive of freight and taxes), of all products shipped, both primary and secondary, as well as all miscellaneous receipts, such as receipts for contract work performed for others, installation and repair, sales of scrap, and sales of products bought and resold without further

processing. Included are all items made by or for the establishments from materials owned by it, whether sold, transferred to other plants of the same company, or shipped on consignment. The net selling value of products made in one plant on a contract basis from materials owned by another was reported by the plant providing the materials.

In the case of multiunit companies, the manufacturer was requested to report the value of products transferred to other establishments of the same company at full economic or commercial value, including not only the direct cost of production but also a reasonable proportion of "all other costs" (including company overhead) and profit. (See discussion of duplication of data below.)

**Individual products**—As in previous censuses, data were collected for almost all industries on the quantity and value of individual products shipped. In the 1982 census program, information was collected on the output of approximately 11,000 individual product items. The term "product," as used in the census of manufactures, represents the finest level of detail for which output information was requested. Consequently, it is not necessarily synonymous with the term "product" as used in the marketing sense. In some cases it may be much more detailed and, in other cases, it is more aggregative. For example, "pharmaceutical preparations" was distributed into over 100 items; whereas, "motor gasoline" was reported as a single item.

Approximately 6,000 of the product items were listed separately on the 1982 census report forms. Data for about 5,000 products were obtained in the monthly, quarterly, or annual surveys comprising the Current Industrial Reports series of the Census Bureau. Totals for the year 1982 for these items, as derived from the commodity surveys, are shown in the "products shipped" table (table 6a) together with the tieline total value collected in the census for reconciliation purposes.

The list of products for which separate information was collected was prepared after consultation with industry and government representatives. Comparability with previous figures was given considerable weight in the selection of product categories so that comparable 1977 information is presented for most products.

Typically, both quantity and value of shipments information was collected. However, if quantity was not significant or could not be reported by manufacturers, only value of shipments was collected.

Shipments include both commercial shipments and transfers of products to other plants of the same company. For industries in which a considerable portion of the total shipments is transferred to other plants of the same company, separate information on interplant transfers was also collected. Moreover, for products that are used to a large degree within the same establishment as materials or components in the fabrication of other products, total production and often consumption of the item within the plant was collected. Typically, the information on production was also collected for products for which there are significant differences between total production and shipments in a given year because of wide fluctuations in finished goods inventories. Other measures of output of products with long production cycles were used as appropriate and feasible.

**Classes of products**—To summarize the product information, the separate products were aggregated into classes of products that, in turn, were grouped into all primary products of each industry. The code structure used is a seven-digit number for the

individual product, a five-digit number for the class of product, and a four-digit number for the total primary products in an industry. (See Introduction, Industry Classification of Establishments, for application of the coding structure to the assignment of SIC codes for establishments.)

In the 1982 census, the 11,000 products were grouped into approximately 1,500 separate classes on the basis of general similarity of manufacturing processes, types of materials used, and the like. However, the grouping of products was affected by the economic significance of the class and, in some cases, dissimilar products were grouped because the products were not sufficiently significant to warrant separate classes.

**Duplication in cost of materials and value of shipments**—The aggregate of the cost of materials and value of shipments figures for industry groups and for all manufacturing industries includes large amounts of duplication, since the products of some industries are used as materials by others. With some important exceptions, such as for motor vehicles and parts, this duplication is not significant at the four-digit industry level. However, it is significant at the two-digit and three-digit industry group level because these totals often include industries that represent successive stages in the production of a finished manufactured product. Examples are the addition of flour mills to bakeries in the "Food" group and the addition of pulp mills to paper mills in the "Paper and Allied Products" group of industries. Estimates of the overall extent of this duplication indicate that the value of manufactured products exclusive of such duplication (the value of finished manufactures) tends to approximate two-thirds of the total value of products reported in the census of manufactures.

**Value added by manufacture**—This measure of manufacturing activity is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments (products manufactured plus receipts for services rendered). The result of this calculation is adjusted by the addition of value added by merchandising operations (i.e., the difference between the sales value and the cost of merchandise sold without further manufacture, processing, or assembly) plus the net change in finished goods and work-in-process between the beginning- and end-of-year inventories.

Because of the change in instructions for reporting inventories for 1982, the 1982 figure for value added is not strictly comparable to prior-year data. This is explained more fully in the inventories section below.

"Value added" avoids the duplication in the figure for value of shipments that results from the use of products of some establishments as materials by others. Value added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

**New and used capital expenditures**—For establishments in operation and establishments under construction but not yet in operation, manufacturers were asked to report their new expenditures for (1) permanent additions and major alterations to manufacturing establishments, and (2) machinery and equipment used for replacement and additions to plant capacity if they were of the type for which depreciation accounts were ordinarily maintained.

The totals for new expenditures exclude that portion of expenditures leased from nonmanufacturing concerns, new facilities owned by the Federal Government but operated under

contract by private companies, and plant and equipment furnished to the manufacturer by communities and nonprofit organizations. Also excluded are expenditures for used plant and equipment (although reported in the census), expenditures for land, and cost of maintenance and repairs charged as current operating expenses.

Manufacturers were also requested to report the value of all used buildings and equipment purchased during the year at the purchase price. For any equipment or structure transferred to the use of the reporting establishment by the parent company or one of its subsidiaries, the value at which it was transferred to the establishment was to be reported. Furthermore, if the establishment changed ownership during the year, the cost of the fixed assets (building and equipment) was to be reported under used capital expenditures.

Total expenditures for used plant and equipment is a universe figure; i.e., it is collected on all census forms. However, the breakdown of this figure between expenditures for used buildings and other structures and expenditures for used machinery and equipment is collected only on the ASM form and is subject to sampling error (see table 3d). The data for total new capital expenditures, new building expenditures, and new machinery expenditures, as well as the data for total used expenditures, are shown in both tables 3a and 3d. The figure in table 3a is a census universe total and may differ from the results of the ASM sample shown in table 3d. Since the figures in table 3d are subject to sampling error, they are not considered as reliable as the universe figures.

**End-of-year inventories**—Respondents were asked to report their 1981 and 1982 end-of-year inventories at cost or market. Effective with the 1982 Economic Censuses, this change to a uniform instruction for reporting inventories was introduced for all sector reports. Prior to 1982, respondents were permitted to value inventories using any generally accepted accounting method (FIFO, LIFO, market, to name a few). In 1982, LIFO users were asked to first report inventory values prior to the LIFO adjustment and then to report the LIFO reserve and the LIFO value after adjustment for the reserve.

Because of this change in reporting instructions, the 1982 data for inventories and value added by manufacture included in the tables of this report are not comparable to the prior-year data shown in table 1a of this report and in historical census of manufactures and annual survey of manufactures publications. Inventories and value added data estimated on a basis comparable to the historical data, using the reported information for 1982, are shown in footnote 4 of table 1a. However, the end-of-1981 figure shown in this footnote may differ from the corresponding value published as part of the 1981 Annual Survey of Manufactures.

This difference at the four-digit SIC level is due primarily to the effects of industry shifts. As described in the Industry Classification of Establishments section of the Introduction, ASM noncertainty plants are allowed to shift from one industry to another in a census year; whereas, they are "frozen" in a particular industry in ASM years. Other explanations for this difference include the effects of sampling and processing errors and revisions to end-of-1981 data reported by respondents.

In using inventory data by stage of fabrication for "all industries" and at the two-digit industry level, it should be noted that an item treated as a finished product by an establishment in one industry may be reported as a raw material by another establishment in a different industry. For example, the finished-product inventories of a steel mill would be reported as raw

materials by a stamping plant. Such differences are present in the inventory figures by stage of fabrication shown for individual industries, industry groups, and "all manufacturing," which are aggregates of figures reported by establishments in specified industries.

**Specialization and coverage ratios**—These items are not collected on the report forms but are derived from the data shown in table 5b. An establishment is classified in a particular industry if its shipments of primary products of that industry exceed in value its shipments of the products of any other single industry.

As noted in the Introduction, an establishment's shipments include those products assigned to an industry (primary products), those considered primary to other industries (secondary

products), and receipts for miscellaneous activities (merchandising, contract work, resales, etc.). Specialization and coverage ratios have been developed to measure the relationship of primary product shipments to the data on shipments for the industry shown in tables 1a through 5a and data on product shipments shown in tables 6a through 6c.

Specialization ratio represents the ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for the establishments classified in the industry.

Coverage ratio represents the ratio of primary products shipped by the establishments classified in the industry to the total shipments of such products that are shipped by all manufacturing establishments wherever classified.

## SECTION 2. ITEMS COLLECTED ONLY ON ASM REPORT FORMS

**Supplemental labor costs**—Supplemental labor costs are divided into legally required expenditures and payments for voluntary programs. The legally required portion consists primarily of Federal old age and survivors' insurance, unemployment compensation, and workers' compensation. Payments for voluntary programs include all programs not specifically required by legislation whether they were employer initiated or the result of collective bargaining. They include the employer portion of such plans as insurance premiums, premiums for supplemental accident and sickness insurance, pension plans, supplemental unemployment compensation, welfare plans, stock purchase plans on which the employer payment is not subject to withholding tax, and deferred profit-sharing plans. They exclude such items as company-operated cafeterias, in-plant medical services, free parking lots, discounts on employee purchases, and uniforms and work clothing for employees. While the excluded items do benefit employees and all or part of their cost generally is similar to the items covered in the ASM labor costs statistics, accounting records do not generally provide reliable figures on net employee benefits of these types.

**Cost of purchased services**—ASM establishments were requested to provide information on the cost of purchased services for the repair of buildings and other structures, the repair of machinery, and communication services. Included in the cost of purchased services for the repair of buildings and machinery are payments made for all maintenance and repair work on buildings and equipment, such as painting, roof repairs, replacing parts, and overhauling equipment. Such payments made to other establishments of the same company and for repair and maintenance of any leased property are also included. Extensive repairs or reconstruction that were capitalized are considered capital expenditures for used buildings and machinery and are, therefore, excluded from this item. Repair and maintenance costs provided by an owner as part of a rental contract or incurred directly by an establishment in using its own work force are also excluded.

The response coverage ratio shown in table 3d for each of the three types of purchased services listed above is a measure of the extent to which respondents reported for each item. It is derived for each item by calculating the ratio of the weighted employment (establishment data multiplied by sample weight; see section 3) for those ASM establishments that reported the

specific inquiry to the weighted total employment for all ASM establishments classified in the industry.

**Electric energy used for heat and power**—Data on the cost of purchased electric energy were collected on all census forms. However, data on the quantity of purchased electric energy and quantity of generated-less-sold electric energy were collected only on the ASM forms. The cost and quantity of purchased electric energy represent the amount actually used during the year for heat and power. In addition, information was collected on the quantity of electric energy generated by the establishment and the quantity of electric energy sold or transferred to other plants of the same company.

**Beginning- and end-of-year depreciable assets**—The data encompass all fixed depreciable assets on the books of establishments at the beginning and at the end of the year. The values shown (book value) represent the actual cost of assets at the time they were acquired, including all costs incurred in making the assets usable (such as transportation and installation). Included are all buildings, structures, machinery, and equipment (production, office, and transportation equipment) for which depreciation reserves are maintained. Excluded are non-depreciable capital assets, including inventories and intangible assets, such as patent rights and royalties. Also excluded are land and depletable assets, such as timber and mineral rights.

The definition of fixed depreciable assets is consistent with the definition of capital expenditures. For example, expenditures include actual capital outlays during the year, rather than the final value of equipment put in place and buildings completed during the year. Accordingly, the value of assets at the end of the year includes the value of construction in progress. In addition, respondents were requested to make certain that assets at the beginning of the year plus new and used capital expenditures, less retirements, equalled assets at the end of the year.

**New and used capital expenditures**—The data for total new capital expenditures, new building expenditures, new machinery expenditures, and total used capital expenditures are collected on all census forms. However, the breakdown between expenditures for used buildings and other structures and expenditures for used machinery and equipment is collected only on the ASM form. (See further explanation on capital expenditures in section 1.)

**Breakdown of new capital expenditures for machinery and equipment**—ASM establishments were requested to separate their capital expenditures for new machinery and equipment into (1) automobiles, trucks, etc., for highway use, (2) computers and peripheral data processing equipment, and (3) all other.

The category "automobiles, trucks, etc., for highway use" is intended to measure expenditures for vehicles designed for highway use that were acquired through a purchase or lease-purchase agreement. Vehicles normally operating off public highways (vehicles specifically designed to transport materials, property, or equipment on mining, construction, logging, and petroleum development projects) are excluded from this item.

The "not specified by kind" or n.s.k. item for expenditures for new machinery and buildings, shown in table 3d, represents the total machinery and equipment expenditures for establishments that did not break down their expenditures for the three specific categories. This means that for most industries the specific categories are understated.

**Retirements**—Included in this item is the gross value of assets sold, retired, scrapped, destroyed, etc., during 1982. When a complete operation or establishment changed ownership, the respondent was instructed to report the value of the assets sold at the original cost as recorded in the books of the seller. The respondent was also requested to report retirements of equipment or structures owned by a parent company that the establishment was using as if it were a tenant.

**Rental payments**—This item includes rental payments for the use of all items for which depreciation reserves would be maintained if they were owned by the establishment, e.g., structures and buildings, and production, office, and transportation equipment. Excluded are royalties and other payments for the use of intangibles and depletable assets, and land rents where separable.

When an establishment of a multiestablishment company was charged rent by another part of the same company for the use of assets owned by the company, it was instructed to exclude that cost from rental payments. However, the book value (original cost) of these company-owned assets was to be reported as assets of the establishment at the end of the year.

If there were assets at an establishment rented from another company, and the rents were paid centrally by the head office of the establishment, the company was instructed to report these rental payments as if they were paid directly by the establishment.

**Depreciation charges**—This item includes depreciation and amortization charged during the year against assets. Depreciation charged against fixed assets acquired since the beginning of the year and against assets sold or retired during the year are components of this category. Respondents were requested to make certain that they did not report accumulated depreciation.



# **APPENDIX B.**

## **Annual Survey of Manufactures (ASM) Sampling and Estimating Methodologies**

### **DESCRIPTION OF SURVEY SAMPLE**

The Annual Survey of Manufactures (ASM) contains two components. The mail portion of the survey is a probability sample of about 55,000 manufacturing establishments selected from a total of about 225,000 establishments. These 225,000 establishments represent all manufacturing establishments of multiunit companies and all single-unit manufacturing establishments with five employees or more tabulated in the 1977 Census of Manufactures. This mail portion is supplemented by a Social Security Administration list of new manufacturing establishments opened after 1977. The individual establishments were defined as the sampling unit for this sample. This is a change from the previous ASM sample when companies were used as the sampling unit. The implication of this change is that the probability of selection of any establishment relates only to the size of the establishment itself and is independent of the size of the company with which the establishment is affiliated. The efficiencies associated with the change to an establishment sample have made it possible to reduce the mail sample panel from 70,000 establishments in 1978 to 55,000 establishments in the current panel.

The nonmail portion of the survey includes all single-unit establishments that were tabulated with less than five employees in the 1977 Census of Manufactures. Although this portion contained approximately 125,000 establishments, it accounted for less than 2 percent of the estimate for total value of shipments at the total manufacturing level. This portion was not sampled; rather, the data for every establishment in this group were estimated based on selected information obtained annually from the administrative records of other Federal agencies. This administrative record information, which includes payroll, total employment, industry classification, and physical location of the establishment, was obtained under special conditions, which safeguard the confidentiality of both tax and census records. Estimates for data for these small establishments were developed using industry averages in conjunction with the administrative information.

The corresponding estimates for the mail and nonmail establishments were added together, along with the adjusted base-year differences as defined in Description of Estimating Procedures below. The remaining description of the survey sample relates only to the mail portion of the ASM sample.

All establishments with 250 employees or more in the 1977 census were included in the survey panel with certainty. These establishments collectively account for approximately 65 percent of the total value of shipments for manufacturing establishments in the 1977 census. Smaller establishments were sampled with probabilities ranging from 1.000 down to 0.005 in accordance with mathematical theory for optimum allocation of a sample.

The probabilities of selection assigned to the smaller establishments were proportional to measures of size determined for each establishment. For establishments included in the 1977 Census of Manufactures, the measure of size depended directly upon each establishment's 1977 product class values and the

historic variability of the year-to-year shipments of each product class. Roughly equivalent measures of size were assigned to postcensus birth establishments based on their industry codes and anticipated payroll and employment.

The method of assigning measures of size was used in order to maximize the precision (that is, minimize the variance of estimates of the year-to-year change) in the value of product class shipments. Implicitly, it also gave weight to differences in employment, value added, and other general statistics, for these are highly correlated with value of shipments. Individual sample selection probabilities were obtained by multiplying each establishment's final measure of size by an overall sampling fraction coefficient calculated to yield a total expected sample size.

The sample selection procedure gave each establishment in the sampling frame an independent chance of selection. This method of independent selection permits the rotation of establishments into and out of a given sample panel without introducing a bias into the survey estimates.

### **DESCRIPTION OF ESTIMATING PROCEDURES**

Most of the ASM estimates for the years 1978-1981 were computed using a modified "difference estimate" formula. For each item, a base-year difference was developed. This base-year difference is equal to the difference between the 1977 census published number for an item total and the linear ASM estimate of the total for 1977. The ASM linear estimate was obtained by multiplying each sample establishment's data by its sample weight (the reciprocal of its probability of selection) and summing the weighted values.

This base-year difference was then adjusted to reflect the estimated growth at the four-digit or, in the case of product classes, five-digit based Standard Industrial Classification (SIC) level from 1977 to the year of the survey; for example, 1981. It should be noted that due to processing constraints, the growth factors lagged one year; i.e., if 1981 is the survey year, they were not based on the estimated growth from 1977 to 1981 but rather the growth from 1977 to 1980. This one-year lag had negligible effect on the estimates, particularly at the total manufacturing level where the adjusted base-year difference accounted for less than 1 percent of the estimate for total value of shipments.

These adjusted base-year differences were then added to the corresponding current-year linear estimates, which include the sum of the estimates for the mail and nonmail establishments, to produce the estimates for the years 1978-1981. Estimates developed by this procedure usually are far more reliable than comparable linear estimates developed from the current sample data alone.

The 1982 sample data included in table 3d were also developed using difference estimates. However, since the universe totals for the census year (1977 or 1982) were not known, a modification of the procedure described above was necessary. For each item in table 3d, except purchased services and breakdown of expenditures for new machinery and equipment (see further description in appendix A, section 2), linear

estimates of the publication totals from the ASM mail sample were adjusted by the difference between imputed census totals and the corresponding ASM mail sample estimates of these imputed totals. These imputed totals are obtained by applying industry average ratios to control item values at the establishment level. For example, an imputed total beginning assets figure is obtained by multiplying each establishment's total value of shipments by the industry (four-digit SIC) average for the ratio of beginning assets to shipments.

Separate estimates for the nonmail establishments were not developed. However, their contribution to the publication estimates is reflected in the difference adjustment.

The method of inventory valuation percentages included in table 3c was developed using both complete census information and ASM estimates. The percentages for the four major categories (LIFO, non-LIFO, valuation method not reported, and LIFO reported without associated value and reserve) were derived from the complete census and correspond to the values included in table 3d. The percentages for the specific non-LIFO methods of valuations (FIFO, average cost, specific costs, etc.) are ratio estimates developed from the ASM in conjunction with the census universe estimate for the total of the non-LIFO methods.

## QUALIFICATIONS OF THE DATA

The estimates developed from the sample are apt to differ somewhat from the results of a survey covering all companies in the sampled lists but otherwise conducted under essentially the same conditions as the actual sample survey. The estimates of the magnitude of the sampling errors (the differences between the estimates obtained and the results theoretically obtained from a comparable, complete-coverage survey) are provided by the standard errors of the estimates.

The particular sample selected for the ASM is one of a large number of similar probability samples that, by chance, might have been selected under the same specifications. Each of the possible samples would yield somewhat different sets of results, and the standard errors are measures of the variation of all the possible sample estimates around the theoretical, comparable, complete-coverage values.

Estimates of the standard errors have been computed from the sample data for selected statistics in this report. Except for table 3c, they are presented in the form of relative standard errors, the standard errors divided by the estimated values to which they refer. In table 3c, "absolute" standard errors of the estimates are presented.

In conjunction with its associated estimate, the relative standard error may be used to define confidence intervals (ranges that would include the comparable, complete-coverage value for specified percentages of all the possible samples).

The complete coverage value would be included in the range:

1. From one standard error below to one standard error above the derived estimate for about two-thirds of all possible samples.

2. From two standard errors below to two standard errors above the derived estimate for about 19 out of 20 of all possible samples.
3. From three standard errors below to three standard errors above the derived estimate for nearly all samples.

An inference that the comparable, complete-survey result would be within the indicated ranges would be correct in approximately the relative frequencies shown. Those proportions, therefore, may be interpreted as defining the confidence that the estimates from a particular sample would differ from complete-coverage results by as much as one, two, or three standard errors, respectively.

For example, suppose an estimated total is shown as 50,000 with an associated relative standard error of 2 percent, that is, a standard error of 1,000 (2 percent of 50,000). There is approximately 67 percent confidence that the interval 49,000 to 51,000 includes the complete-coverage total and about 95 percent confidence that the interval 48,000 to 52,000 includes the complete-coverage total.

In addition to the sample errors, the estimates are subject to various response and operational errors: errors of collection, reporting, coding, transcription, imputation for nonresponse, etc. These operational errors would also occur if a complete canvass were to be conducted under the same conditions as the survey.

Explicit measures of their effects generally are not available. However, it is believed that most of the important operational errors were detected and corrected in the course of the Bureau's review of the data for reasonableness and consistency. The small operational errors usually remain. To some extent, they are compensating in the aggregated totals shown. When important operational errors were detected too late to correct the estimates, the data were suppressed or were specifically qualified in the tables.

As derived, the estimated standard errors included part of the effect of the operational errors. The total errors, which depend upon the joint effect of the sampling and operational errors, are usually of the order of size indicated by the standard error, or only moderately higher. However, for particular estimates, the total error may considerably exceed the standard errors shown.

The concept of complete coverage under the conditions prevailing for the ASM is not identical to the complete coverage of the census of manufactures, as the censuses have been conducted. Nearly all types of operational errors that affect the ASM also occur in the censuses. The ASM and the censuses, are conducted under quite different conditions, and operational errors can be better controlled in the ASM than in the censuses. As a result, for many of the census figures, the errors are of the same order of size as the total errors of the corresponding annual survey estimates. The differences between the census and ASM operating conditions also disturb, to some degree, the comparability of the ASM and census data.

Any figures shown in the tables in this publication having an associated standard error exceeding 15 percent may be of limited reliability. However, the figure may be combined with higher-level totals, creating a broader aggregate, which then may be of acceptable reliability.

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# PUBLICATION PROGRAM

## 1982 CENSUS OF MANUFACTURES

Publications of the 1982 Census of Manufactures, containing preliminary and final data on manufacturing establishments in the United States, are described below. Publication order forms for the specific reports may be obtained from any Department of Commerce district office or from Data User Services Division, Customer Services (Publications), Bureau of the Census, Washington, D.C. 20233

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Preliminary industry data are issued in 443 separate reports covering 452 industries (or combinations of industries). Preliminary data for States are grouped and released in reports for each of the nine census geographic divisions.

### Final Reports

Final detailed statistics are issued in separate paperbound reports.

#### Industry series—82 reports (MC82-I-20A to -39D)

Each of the 82 reports provides information for a group of related industries (e.g., "dairy products" includes industries for butter, cheese, milk, etc.). Final figures for the United States are shown for each of the 452 manufacturing industries on quantity and value of products shipped and materials consumed, cost of fuels and electric energy, capital expenditures, assets, rents, inventories, employment, payroll, payroll supplements, hours worked, value added by manufacture, number of establishments, and number of companies. Comparative statistics for earlier years are provided where available.

For each industry, data on value of shipments, value added by manufacture, capital expenditures, employment, and payroll are shown by employment-size class of establishment and degree of primary product specialization. Statistics are given on production of specific products and consumption of energy and various materials by industry.

#### Geographic area series—51 reports (MC82-A-1 to -51)

A separate report for each State and the District of Columbia presents data for industry groups and industries on value of shipments, cost of materials, value added by manufacture, employment, payroll, hours worked, new capital expenditures, and number of manufacturing establishments for the State, SMSA's, and large industrial counties and places. Comparative statistics for earlier census years are shown for the State and large SMSA's. Manufacturing totals are presented for each county and for places with significant manufacturing activity. Detailed statistics—including inventories, assets, rents, and energy costs—are presented only in statewide totals.

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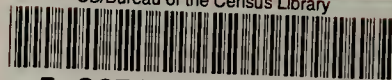




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